



Additional chart coverage may be found in CATP2, Catalog of Nautical Charts.

## SECTOR 2 — CHART INFORMATION

## SECTOR 2

### WEST COAST OF INDIA—DIU HEAD TO CAPE RAMA (INCLUDING THE GULF OF CAMBAY AND BOMBAY)

**Plan.**—This sector describes the W coast of India between Diu Head and Cape Rama, including the Gulf of Cambay. The sector includes the port of Bombay, the largest seaport on the W coast of India. The arrangement of the sector is from N to S.

#### General Remarks

**2.1** An extensive offshore area, bounded approximately by the parallels of 18°00'N and 19°50'N, and the meridians of 71°00'E and 72°40'E, is being developed for oil production. Numerous oil derricks, oil production platforms, single point moorings, etc., obstruct navigation within the area.

Recommended routes have been established by Indian authorities to aid traffic transiting the area, as well as vessels bound to or from the port of Bombay. The Indian government requests that vessels remain 1 to 2 miles to starboard of the tracklines shown on the chart, consistent with safe navigation, and the International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS).

The extent of the development area and the recommended routes are best seen on the appropriate chart.

#### Diu Head to Diu Harbor

**2.2 Diu Head** (20°41'N., 70°50'E.), a rocky bluff about 30m high, can be identified by the lighthouse, two long buildings, and a small temple lying near its summit. From this summit the land slopes gradually E, terminating in a rocky point, on which there is a cairn, 8m high.

The Gir Hills, about 25 miles N of Diu Head, extend about 40 miles in an E-W direction and attain an elevation of about 640m, but cannot be seen from any great distance from the SW. Nandivela, 529m high, the SE peak of the range, lies about 27 miles NE of Diu Head and is conspicuous from the S.

**Madhwad Bay** (Mandwa Bay) (20°42'N., 70°56'E.) lies between the E extremity of Diu Head and Nagwa Point, the SW extremity of Diu Island, about 3.5 miles E. The bay affords shelter from NW winds, and the holding ground is good, but there is frequently a swell setting into it. The anchorage should not be used with S or E winds.

The coast at the head of the bay between Diu Head and Brancavara Creek, about 2.3 miles ENE, consists of low sand hills backed by marshy land, which is partly submerged at HW springs. Between Brancavara Creek and Nagwa Point, the coast consists of sand dunes which extend inland to a thick unbroken belt of palm trees.

Madhwad Creek, which dries, is entered about 0.9 mile NNW of the E extremity of Diu Head.

**Nagwa Point** (20°42'N., 70°54'E.) is a dark bluff, with cliffs 9.1 to 12.2m high, rising to a 20m summit marked by a bush. Shoal water, over which the sea breaks occasionally, extends about 0.3 mile WSW from Nagwa Point.

A conspicuous temple lies on the E entrance point of Brancavara Creek. Another prominent temple is situated about 0.5 mile farther NE.

**Caution.**—Rocky Shoal, with a least depth of 1.4m, lies in the middle of the entrance of the bay. The E end of this steep-to shoal, over which the sea occasionally breaks, lies about 1.3 miles WSW of Nagwa Point.

**2.3** Madhwad Bainsla, a rock 2m high, lies about 0.2 mile E of the E extremity of Diu Head. Foul ground, over which the sea breaks heavily, extends about 0.1 mile N and 0.3 mile E from this rock. At springs, strong tide rips and overfalls occur E of Madhwad Bainsla.

Kachbi Reef (Khasbi Reef), which dries from 0.6 to 0.9m, lies about 0.5 mile E of the SW entrance point of Brancavara Creek.

**Anchorage.**—Anchorage can be taken on either side of Rocky Shoal. At the anchorage E of this shoal, vessels usually lie across the wind and tide when the ebb current sets out of Brancavara Creek. There are depths of 10 to 12m, sand and mud, at this anchorage.

Moderate-sized vessels can anchor, in 8m, sand and mud, about 1 mile ENE of the E extremity of Diu Head, and about 0.6 mile offshore.

Vessels are not advised to anchor midway between Madhwad Bainsla and the W end of Rocky Shoal because of the strong tidal currents and the exposed position.

Small craft can anchor, in 7m, between Nagwa Point and Kachbi Reef, sheltered from E winds and out of the influence of the tidal currents. Dhows, usually without lights, may be found here at night, as it is a favorite anchorage for sailing craft waiting for the flood current to proceed up the Gulf of Cambay.

**Directions.**—Vessels intending to anchor E of Rocky Shoal should approach with the conspicuous temple on the E entrance of Brancavara Creek bearing 322°, and anchor when the S extremity of Nagwa Point bears 077°, distant 0.9 mile, in 11m, sand and mud.

Vessels approaching from the E and intending to anchor NW of Rocky Shoal should steer with Madhwad Bainsla, or the E extremity of Diu Head, bearing more than 283°, and open well N of the light structure on Diu Head. This course leads S of the S extremity of Rocky Shoal. Course should be altered N for the anchorage about 1 mile ENE of the E extremity of Diu Head, when the E of two distant sharp peaks bears 005°. Steer for this peak on this bearing, taking care to avoid a 4.9m patch about 0.5 mile NW of Rocky Shoal. Vessels can anchor when the cliffs on the S side of the entrance of Madhwad Creek bear 270°, with the S entrance point of the creek about 1.25 miles.

When approaching this latter anchorage it should be remembered that the flood current sets strongly toward Rocky Shoal and the ebb current toward Madhwad Bainsla.

## Diu Harbor (20°43'N., 71°00'E.)

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**2.4** Diu Harbor, between the E end of Diu Island and the mainland N, is open E and somewhat encumbered by shoals.

**Tides—Currents.**—The flood current S of Diu sets ENE, with a greatest velocity at springs of 1.5 knots. It often runs for 2 hours after the time of HW by the shore. The ebb current sets WSW at a velocity of 2 knots at springs, and often runs for 2.5 hours after the water along the shore has begun to rise. These irregularities of tides will account in some measure for the eddy currents off Diu Head.

**Aspect.**—Diu Island is separated from the mainland by Sesalkhada Creek, which runs through the middle of a large swamp. The seaward side of the island is composed chiefly of sandstone cliffs; the hills on its W part are about 30.5m high. The citadel of Forte do Diu, at the E extremity of Diu Island, is conspicuous from seaward.

A light is shown near the center of Forte do Diu; Couraca Light is shown periodically from the NE extremity of the same fort. The town of Diu, close W of the fort, is enclosed by a wall which is breached in many places on its W sides. There are several prominent buildings in the town.

Forte do Mar is situated about 0.2 mile N of Forte do Diu, on the N side of the entrance to Sesalkhada Creek; it lies at the SE edge of a spit and is periodically marked by a light.

A temple, about 0.7 mile NNW of Forte do Mar, is conspicuous in the N part of the village of Ghoghla.

A guard house, with a red roof and a palm tree, are conspicuous about 1.3 miles NNE, and 2 miles N of Forte do Mar.

**Signals.**—Storm signals are displayed from a flagstaff in Forte do Diu; the [Brief System](#) is used.

**Anchorage.**—Diu Harbor affords no protection from the E; vessels should not anchor in the harbor during strong E winds, the holding ground, sand and rock.

The safest and best anchorage is in 14 to 16m, mud, with the light structure near the center of Forte do Diu bearing 315°, distant 0.5 to 0.6 mile. This anchorage is used by local vessels and affords protection from W winds.

There is anchorage, in 5 to 7m, about 1 mile E of Ghoghla. To reach it, vessels should steer for the temple N of Ghoghla, bearing 298°, passing between the dangers ENE of Forte do Diu, and anchoring when Couraca Light bears 240°.

**Caution.**—A rock, with a depth of 1.3m, lies about 0.5 mile E of the E extremity of Diu Island. A 3m rocky patch lies about 0.8 mile farther ENE. A 4.7m depth lies about 1 mile ENE of the E extremity of Diu Island.

A reef, which dries in places, extends about 0.5 mile ENE from the E extremity of Diu Island.

From October to the end of January large fleets of fishing vessels based at Brancawara, at the W end of Diu Island, and also based at Diu, Nawabandar, and **Simar** (20°46'N., 71°10'E.) will be found from 4 to 8 miles offshore; these vessels leave barrel buoys and logs to mark the fishing grounds, and it is advisable to give them a wide berth.

## Diu Harbor to Pipavav Bandar

**2.5 Nawabandar** (20°44'N., 71°05'E.) is a promontory situated 2 miles E of Diu Harbor; the intervening coast is high, with deep water close to it. A light is shown from a white circular building on the promontory. The town of Delvada, about 2.5 miles NW of Nawabandar, has a large conspicuous temple with twin minarets.

Storm signals are shown at Nawabandar; the [Brief System](#) is used.

**Anchorage.**—Good anchorage can be obtained, in 9.1m, mud, with the light structure at Nawabandar bearing 254°, distant 1 mile.

Panikota Islet, about 4.5 miles ENE of Nawabandar, is connected to the mainland W by a drying reef, which also extends about 0.3 mile ENE from the islet. Simar Fort (Simbor Fort), a white flat-topped structure with a flagstaff, is situated at the N end of the islet; a light is shown seasonally from the fort.

Close W of Panikota Islet, a range of cliffs extends about 2 miles W and attains an elevation of 13m; the W end of these cliffs appears as a sharp bluff when seen from E. A temple, 11m high, is situated on the mainland, about 0.3 mile SW of Simar Fort (Simbor Fort).

Bhesla Rock, a rocky islet 8m high, lies about 10.3 miles E of Panikota Islet and is fringed by a drying reef, except on its SE side. A detached drying reef lies from 0.2 to 0.3 mile WSW of Bhesla Rock.

There is good anchorage for small vessels about 0.4 mile N of Bhesla Rock, in 8.2m, mud, in Simar Anchorage (Simbor Anchorage).

Vessels should approach the anchorage from the SE and pass at least 0.2 mile E of Bhesla Rock. The flagstaff on Simar Fort (Simbor Fort) should be brought in line bearing 250° with Khar Beacon, about 1 mile WSW; the vessel should proceed on this range to the anchorage.

The channel between the reef W of Bhesla Rock and the reef projecting ENE of Panikota Islet is not recommended, for although there is plenty of water, there are no navigational aids.

The village of Rajpura (Rajvra) lies on a point about 3.5 miles ENE of Panikota Islet; a light is shown seasonally from this point. There is high ground, with steep cliffs, close W of the village. A shoal, with a least depth of 4.2m, lies about 0.8 mile SW of the point, and about 0.3 mile offshore.

Murex Bluff, 25m high, lies about 5 miles farther ENE. Murex Reef, which dries from 1.8 to 2.7m, extends about 1 mile E of the bluff.

**2.6 Jafarabad** (20°52'N., 71°23'E.) is an open roadstead affording little protection during the Southwest Monsoon. The harbor is shallow and a ledge of flat rocks extends nearly 0.5 mile W from the E side of the harbor entrance. Jafarabad is a walled town, with several round towers, on the highest of which there is a flagstaff, 35m high. The town, situated on high ground, can be seen from the S and E over the intervening rising ground, about 1 mile inland on the W bank of the river of the same name.

Jafarabad Harbor is situated in a shallow bay about 1 mile across, at the entrance to the Jafarabad River. A breakwater

ends with an L-shaped jetty extending about 0.5 mile W from the shore near the cement factory on the E side. A second breakwater extends ENE about 0.3 mile from the W entrance point of the bay. A light shows from the W breakwater head.

**Tides—Currents.**—Outside the harbor, the tidal current sets E with the flood and W with the ebb along the coast.

At springs, the E current continues to run for about 1 hour after the time of HW, and the W current continues to run until 4 hours before the time of the following HW. Both currents attain a maximum velocity of 4 knots after running for 3 hours.

At neaps, the E current continues to run for 30 minutes after the time of HW, and the W current continues to run until 4.5 hours before the time of the following HW. The maximum velocity of the flood is 1.8 knots and of the ebb 1.5 knots.

At neaps, the current changes from ebb to flood in a clockwise direction and the flood to ebb in a counterclockwise direction.

**Depths—Limitations.**—A channel about 40m wide, being dredged to a depth of 5.5m in 1986, leads to a dredged basin of the same depth having a diameter of 300m, around the L-shaped jetty. Range lights, in line bearing 222°, lead to the jetty.

**Aspect.**—Barman Hill, 106m high, is conspicuous about 6.5 miles NNW of Jafarabad. Lor Hill, 146m high, about 3 miles W of Barman Hill, is also conspicuous.

A chimney, 90m high, and a conspicuous tower, 102m high, are situated close together at a cement factory on the E entrance point of the river.

Lights are shown from the SW and NE entrance points of the harbors. A white beacon marks the W edge of the ledge of flat rocks extending from the E side of the harbor entrance.

Vararup Temple, 29m high, is situated close to the coast, about 2 miles W of the W entrance point of Pipavav Anchorage, and is conspicuous from S.

**Anchorage.**—In fine weather, good anchorage can be taken, in 14m, with the light structure on the SW entrance point bearing 260°, and with the light structure on the NE entrance point bearing 036°.

**Caution.**—A dangerous wreck lies about 0.8 mile E of the SW entrance point of the harbor.

The coast between Jafarabad Harbor and the W entrance point of Pipavav Anchorage, about 5 miles ENE, is cliffy with precipitous points, and fringed by a coastal reef. Inland the country is undulating and partially cultivated. Small watch towers, about 1.8m high, lie on most of the hilltops on the coast.

## Pipavav Bandar (20°54'N., 71°31'E.)

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**2.7** Pipavav Bandar is the principal port for Dongar, about 6 miles N, and the principal town on this part of the coast. West Channel, the recommended channel to Pipavav Anchorage, leads between the W entrance point and **Shiyal Bet** (20°54'N., 71°31'E.). East Channel, passing N of Shiyal Bet, should only be used by light-draft vessels with local knowledge, and only at low water.

Pipavav Bandar lies on the NW shore of the West Channel. It is being developed as an all-season port. It imports and exports

bulk cargo including coal, cement and fertilizer, break bulk, and LPG.

Chanch Island, the W extremity of which is located about 2.3 miles NNE of Shival Island, fronts the coast for about 4.5 miles. There is an extensive mangrove swamp close inland, which is submerged only at very high spring tides. A heavy swell occurs during the Southwest Monsoon.

### Port Authority of Pipavav Bandar

<http://www.pipavav.com>

**Tides—Currents.**—The mean spring tide range is about 2.7m. The mean neap tide range is only 1.2m.

The ebb current, which sets SW from S of Chanch Island, divides N of Bhensla Rock. One branch sets W through East Channel and then SW through West Channel, attaining a velocity of 2 knots at springs and 1 knot at neaps. The other branch sets toward Savai Bet Reef and then W along the coast at a velocity of 2 to 2.5 knots at springs and 1.5 knots at neaps.

The flood current sets across the S approach to West Channel and there divides. One branch sets N through the channel and then NE toward Chanch Island at a velocity of 1.5 to 2.5 knots at springs and about 1 knot at neaps. The other branch sets ENE past Savai Bet Reef, and then toward Bhensla Rock at a velocity of 3 knots at springs and 2 to 3 knots at neaps.

Strong eddies form in West Channel at HW and LW.

**Depths—Limitations.**—Only small vessels with local knowledge can proceed to Pipavav Bandar, as there is only a depth of 2.1m in the channel leading to it. The controlling depth for Pipavav Port was reported (2001) to be 9.5m. It was reported that a vessel 225m long was handled at Pipavav Port.

The main jetty is 725m in length, with a depth of 9.5m alongside. It provides three berths. A spur, 300m in length, provides an LPG berth that can accommodate vessels to 45,000 dwt.

A cement factory, situated 1.5 miles WSW of Chacuda Temple, is served by a jetty. The jetty is L-shaped, with a berth 400m in length and a charted depth of 11m alongside.

**Aspect.**—The shores of the islet are composed of rocky cliffs, 10.4 to 16.5m high, with the exception of the NE side and the shore of a small bay on its NW side, which are low and sandy. Remains of old fortifications are on the N and E sides of the islet. The greater part of the islet is covered with ruins of what must have been extensive buildings and temples.

Savai Bet Reef, a drying reef, steep-to on its E edge, extends about 0.4 mile E from Savai Bet.

Bhensla Rock, a bluff rocky islet, 15m high and nearly steep-to on its E side, is located 1 mile ENE of Savai Bet.

Montapat Creek, separating the NW and N sides of Chanch Island from the mainland, is the outlet for waters that cover an immense tract of marshy land at high water.

A circular tower, 9m high, is conspicuous at the W edge of a reef extending about 0.3 mile WSW from the W extremity of Chanch Island.

One Tree Hill, at the W extremity of Chanch Island, is 14m high.

Spit Sand, which dries 0.3m, extends nearly 1.8 miles SW from the SW edge of the above-mentioned reef. The SW edge of Spit Sand is called The Spit and has a least depth of 1.9m.

A palace, 26m high, about 2 miles ENE of the circular tower, is a good landmark from the SE and S.

Beacons on the mainland, in line bearing 019°, and about 2 miles N of Shiyal Bet, lead through West Channel. Beacons stand on drying reef on each side of the entrance to West Channel.

Chachuda Temple, 24m high, is conspicuous on the mainland, about 1.5 miles WSW of Shiyal Bet.

**Pilotage.**—Pilotage is compulsory. Vessels should send their ETA 72 hours, 48 hours, 24, hours, and 12 hours in advance to the Harbormaster. Vessels should call Port Control for pilot boarding and anchoring information. The pilot boards at the anchorage in position 20°53'N, 71°30'E.

**Anchorage.**—There is good anchorage, sheltered from the Southwest Monsoon, in a depth of 9m, mud and sand, between the N end of Shiyal Bet and The Spit. Vessels may also anchor with Chachuda Temple bearing 161°, 1.4 miles distant, in a depth of about 10m.

**Directions.**—Vessels should enter West Channel with the beacons on the mainland in line bearing 019°, and steer in on this bearing until Chachuda Temple bears 275°, when course can be shaped to the anchorage.

## Pipavav Bandar to Gopnath Point

**2.8 Islet Point** (21°00'N., 71°41'E.), about 10 miles NE of Shiyal Bet, is prominent and hilly. Several islets front the point and are connected with each other and the coast by a drying reef of rocks. The S islet, about 0.8 mile S of the point, is 15m high and nearly steep-to. A spit, with a depth of 4m, extends about 0.8 mile ESE from this islet.

Patva Bay, between Islet Point and a bluff point, 15m high, about 2.5 miles WSW, is shallow and mostly dries.

The bight between Islet Point and Gadhada, about 4 miles ENE, is filled with the coastal reef, which extends about 1.3 miles offshore in places. Gadhada, a village, is situated on the edge of a cliff, 20m high. A detached 7.3m patch lies about 3 miles SW of Gadhada, and about 1.8 miles offshore.

The coast between Gadhada and the SW entrance of Mahuva Bay is composed of limestone cliffs and is fringed by a steep-to oastal reef extending about 0.2 mile offshore.

**Mahuva Bay** (21°02'N., 71°47'E.) nearly dries and shows a mass of rocks and stones. Its SW entrance point is a bluff, 24m high; the NE entrance point, which is the SW extremity of Jegri Island, is similar, but 18m high.

Jegri Island, sparsely cultivated, has bold rocky cliffs on its S and E sides, and its W part consists of sandhills from 18 to 23m high. A drying reef extends about 0.2 mile E from the SE extremity of Jegri Island, which is marked by a light.

Mahuva Bandar is situated at the head of Mahuva Bay, and is approached through a creek which nearly dries. Mahuva, a walled town with a conspicuous temple near its center, lies about 2.8 miles N of Mahuva Badar, from which it is separated by an extensive swamp, submerged at HW.

Anchorage can be taken by small vessels, in about 13.1m, mud, with the light structure on Jegri Island bearing 040°, distant 0.6 mile.

Jegri Bay (Katpur Bay), between Jegri Island and Cave Point, about 2.3 miles NE, is a shallow bight, the head of which, consisting of sand and mud, dries to a distance of about

0.7 mile seaward; the depths increase gradually to seaward. Bhawani Temple, on top of a sandhill at the head of Jegri Bay, is conspicuous.

Tidal currents S and W of Jegri Island set in the direction of the line of the coast, with the flood setting E and the ebb setting W; at springs, the flood current attains a velocity of 2.5 knots and the ebb current a velocity of 1 knot.

**Kotada Bluff** (21°07'N., 71°58'E.) is 26m high and conspicuous. During W winds, boats can land on the NE side of the bluff.

Methla Point, about 2 miles farther ENE, is a low rocky projection, 7.6m high, rising about 0.5 mile N to the average elevation of the undulating land in this vicinity of more than 30.5m.

Bhensla Rock, 27m high, lies on the drying coastal reef about 2.5 miles NE of Methla Point.

Jhanjhmer is a walled town on the coast about 4 miles NE of Methla Point. The remains of a square and conspicuous old fort are situated close S of the town. A light is shown about 0.2 mile S of the fort.

Anchorage for small vessels can be obtained, in 10m, sand and mud, about 0.9 mile SE of the fort.

About midway between Jhanjhmer and Gopnath Point, there is a projecting point, 27.4m high, with a tower close inland.

## Gulf of Cambay (Gulf of Khambhat)

**2.9** The Gulf of Cambay is about 30 miles wide at its entrance between **Gopnath Point** (21°12'N., 72°07'E.) and **Suvali Point** (21°05'N., 72°38'E.). Malacca Banks, with deep channels to the W and E, lie in the fairway of the approach. Grant Channel and Sutherland Channel are safer to use than the channels between the banks, as the mariner is able to accurately fix his position from the objects on the coast; Sutherland Channel should be used only by those with local knowledge.

The S part of the gulf is deep, but the N part is encumbered with sand banks, which frequently change because of the force of the bores and freshets from the rivers.

Deep-draft vessels can proceed up the gulf as far as Piram Island, about 28 miles NNE of Gopnath Point. Local knowledge is necessary for vessels navigating above Gogha, about 6 miles NW of Piram Island.

**Caution.**—Considerable shoaling is reported in the entrance of the Gulf of Cambay and mariners should navigate with caution in this vicinity.

The sand and banks in the upper part of the gulf are subject to great alterations. Any directions for navigating this area must be considered as general only; local knowledge is necessary.

Malacca Banks is the general name for four long narrow shoals lying in and obstructing the entrance of the Gulf of Cambay, between the parallels of 20°20'N and 21°20'N. These shoals, named in order from W, are Western Bank, Narbada Bank, Breaker Bank, and Eastern Bank.

Deep channels are between these shoals, but they are narrow at their N ends, and it is inadvisable to use them.

Western Bank dries in places.

Grant Channel, between Western Bank and the coast NW, is steep-to on both sides, with general depths of 11.3 to 27m. The bottom is sand toward the bank and mud toward the coast. Less

water than charted has been reported (1993) in Grant Channel off the N end of Western Bank.

Narbada Bank has a large area of drying sand near its center.

Breaker Bank has a long sand bank near its center, which may be seen a long distance from the masthead when the sun shines on it at high-water neaps, but it is submerged at high-water springs. Depths of 2.7 to 3.3m lie at the N end of Breaker Bank, about 16 miles ENE of Gopnath Point; a drying patch was reported (1954) in this vicinity. A dangerous wreck lies about 5 miles SW of Breaker Bank.

Eastern Bank has several shoal patches, some of which dry. Because the depths are deep within 0.2 mile of these shoal patches in many places, soundings give little warning of the approach to these dangers.

Sutherland Channel, between Eastern Bank and the coast E, is about 2.5 miles wide at its narrowest part, WNW of Suvali Point. Two lighterage areas, one for general cargo and one for chemical and LPG cargo, which are best seen on the chart, are located about 5 miles W of Suvali Point.

**2.10 Hazira Offshore Terminal** (21°09'N., 72°34'E.) is situated about 6 miles NW of Suvali Point, at the head of Sutherland Channel. The pilot, which boards at the Surat Roads Anchorage, can be contacted on VHF channel 67.

The terminal is an SPM and is approached through Sutherland Channel. Tidal currents set N and S in the channel at rates of up to 6 knots at springs. Vessels between 15,000 and 50,000 dwt, with a maximum draft on arrival of 13m, can be accommodated.

Vessels are berthed only during daylight hours during slack water.

**Caution.**—The N end of Malacca Banks should not be approached with an ebb tide, because, being nearly steep-to, soundings do not give sufficient warning. This area also has not been closely examined. Tapani Oil Development Area is located in the W approach to the Gulf of Cambay. Several unlit structures are situated within this area.

## Gulf of Cambay—West Side

**2.11 Gopnath Point** (21°12'N., 72°07'E.), the W entrance point of the Gulf of Cambay, is moderately high, with a conspicuous light structure and bungalow on it. A temple, 23m high, lies near the coast, about 0.8 mile N of the point.

Gopnath Point Light is shown from a white masonry tower on a hillock close within the point.

A reef, which dries 2.7m, extends about 1.5 miles ENE from Gopnath Point.

Gopnath Shoals, nearly steep-to on the E side, extend about 3.5 miles NNE from about 2 miles ENE of Gopnath Point. The shoals consist of a reef, which dries from 1.2 to 2.7m, and several patches with depths of less than 5.5m.

Sultanpur Shoals extend about 4 miles NNE from the N end of Gopnath Shoals to about 9 miles NNE of Gopnath Point, then W to the coast. These shoals consist of drying rock, sand and clay, and numerous patches with depths of 0.6 to 5.5m.

**Tides—Currents.**—Within Gopnath Shoal and Sultanpur Shoal the flood current at springs does not turn until more than 1 hour after the time of HW, and the ebb current continues to run for more than 1.5 hours after the tide has commenced

rising. At neaps the flood current turns 2 hours after the time of HW.

The coast between Gopnath Point and Kuda Point, about 28 miles NNE, is low and covered with sandhills for about 18 miles to Mitivirdi; then it is comparatively high, with several ravines close to the coast. The country is flat and cultivated, with many scattered villages mostly surrounded by trees; inland it is generally from 30 to 61m high.

Talaja Hill, rising from a level plain about 10 miles NNW of Gopnath Point, and 5 miles inland, is a steep conical hill, about 113m high, with a conspicuous temple on its summit.

Palitana Mountain, 596m high, is conspicuous about 12 miles WNW of Talaja Hill.

Khokhra Hills, the S end of which lies about 9.5 miles NNE of Talaja Hill, extends about 7.5 miles N. Its summit, 300m high, near the N end of the range, is conspicuous.

**2.12 Alang Shipbreaking Yard** (21°30'N., 72°20'E.) is located about 5 miles SSW of Piram Island Light. Vessels to be scrapped are normally run in to the beach on high tide (HW over 10m) twice a month. There are no size restrictions for vessels calling at Alang to be scrapped.

**Tides—Currents.**—Tide information is produced by the port department and can be attained by contacting local agents.

**Regulations.**—Masters are to send their ETA's 72 hours, 48 hours, and 24 hours prior to arrival. Vessels slated for demolition must arrive without any cargo on board.

**Anchorage.**—The primary anchorage is 5 miles S of Piram Island Light.

**Kuda Point** (21°38'N., 72°18'E.), 10m high, has a thick clump of trees and a white bungalow on it. The trees are conspicuous from N or S, and the bungalow shows well during the forenoon when seen from E.

Mallock Reef, about 1.5 miles SE of Kuda Point, lies on the W side of the channel between it and the reef extending NW from Piram Island.

Piram Island, 11m high and composed of sand, lies with its N end about 2.8 miles SE of Kuda Point. At the S end of the island there are a few trees and a little cultivation; the NE side is fringed by a few mangrove trees. The lighthouse is conspicuous near the middle of the island; a small village is situated close N of the lighthouse.

Reefs surround the island and extend about 2.5 miles NNE, 0.5 mile E, and 1.5 miles SSE from the island. Shoal water, with depths of less than 11m, extends about 7.8 miles SSW from the S end of the reef surrounding Piram Island.

The narrow channel between Mallock Reef and Piram Island should not be used without local knowledge as the tide runs through at a great velocity and there is very little slack water.

## Bhavnagar (21°46'N., 72°14'E.)

[World Port Index No. 48760](#)

**2.13** The port of Bhavnagar consists of a tidal basin capable of receiving deep-draft vessels. The Kalubhar River (Bhaunagar Creek), entered about 3 miles farther N, is only accessible to small coasters. Large vessels wishing to communicate with the city of Bhavnagar (Bhaunagar), or discharge cargo in the stream, can anchor N of Perigee Rock.

The coast between Kuda Point and **Ghogha** (21°41'N., 72°17'E.), about 4 miles NNW, is low and marshy. It is fronted by reefs, parts of which dry, and shoalwater extends nearly 2.5 miles offshore. Abreast Ghogha, the foreshore is mud and shingle, drying to a distance of about 0.5 mile offshore.

Ghogha is a walled town and the land in the vicinity is inundated at spring tides.

The coast from Ghogha to Bhavnagar Point, about 9 miles NNW, consists of a mud flat overgrown by low mangrove bushes, and intersected by numerous small drying creeks.

**Tides—Currents.**—The tidal rise at Bhavnagar is 10.2m at MHWS and 8.3m at MHWN. At Piram Island, high tide is 40 minutes earlier, and the tidal rise is 8.9m at MHWS and 7.3m at MHWN.

The direction and velocity of the tidal currents are irregular between Gopnath Point and Bhavnagar and are affected by local winds, especially in Malcolm Channel. At the S of Channel Bank, the current divides.

At the N end of Bhavnagar Channel, the flood and ebb currents have a velocity of about 3 knots at springs and 2.5 knots at neaps. These velocities are likely to increase when freshets occur in the Kalubhar River. The general direction of the tidal currents is parallel to the coast.

The duration of SW at the N end of Bhavnagar Channel varies from 13 to 20 minutes at springs and from 12 to 22 minutes at neaps.

**Depths—Limitations.**—Vessels up to 152m long, with a maximum beam of 19.5m, can enter the port. The permissible draft is reported to be the height of the predicted tide less 5.2m.

The tidal basin of Bhavnagar New Port can accommodate two vessels of up to about 128m in length. The permissible draft varies between 7m and 9.1m, depending on the height of the tide. The concrete wharf on the S side of the tidal basin, near its head, is 269m long; the basin has depths of 7.6 to 9.1m. The entrance width of the lock gate is 21m, and vessels with a maximum beam of 19.8m can enter the tidal basin.

Vessels arrive and depart at about HW slack. They enter with a tug ahead; another is available in the turning basin, where they are usually swung and berthed starboard side-to.

On the S side of the Kalubhar River, and N of the city of Bhavnagar, there is a steel pier which can accommodate coastal vessels of medium draft. Vessels using the pier lie alongside with an anchor down, and can lie on the mud at LW.

**Aspect.**—A shoal, with a least depth of 8.8m, lies about 4.3 miles NNE of Piram Island. An 8.8m patch lies about 1.3 miles WNW of the shoal. A 5.1m patch lies about 5.5 miles N of Piram Island.

Perigee Rock, which dries 1.2m, lies about 2.3 miles NE of Ghogha; it shows three heads above water at the lowest ring tides.

Perigee Light Vessel is moored about 0.9 mile S of Perigee Rock. Depths E and SE of Perigee Rock, to a distance of about 4 miles, are irregular.

A shoal, which dries 2.1m, extends N from a position about 2 miles NE of Perigee Rock.

A stranded wreck lies 2.8 miles E of Perigee Rock.

Channel Bank, which dries 5.5m and is covered with grass, extends N from about 2 miles N of Gogha.

Rhuk Bank, with its S end about 7 miles NNW of Gogha, extends about 10 miles N, partially covers at HWS, and is covered with mangrove bushes.

Bhavnagar Channel lies SW of Channel Bank..

**Ruvapari Light** (21°47'N., 72°14'E.) is shown from a gray hut on piles, on the SW side of Bhavnagar Channel, about 1 mile NNW of Bhavnagar New Port.



**Ruvapari Light**

A tower, 25m high, is conspicuous about 0.8 mile S of Bhavnagar New Port, and 0.5 mile inland.

Lights, in line bearing 251°, situated at the head of Bhavnagar New Port, lead into the tidal basin.

Mariners are warned that due to frequent changes in the banks and channels N of Piram Island, local knowledge is necessary.

A light is shown on Bhavnagar Point and on Johnson Point, about 1.3 miles ESE. The above points are the W and E entrance points, respectively, of the Kalubhar River.

Beacons, in range, lead across the drying banks in the Kalubhar River. Due to the continual silting, the depths in the river and its approaches are liable to change, and the range beacons are liable to alteration. Dredging is continually in progress.

**Pilotage.**—Pilotage is compulsory. Pilots will board vessels about 4.5 miles NNE of Piram Island, not later than 2.5 hours before the time of HW at Bhavnagar for docking on the same tide. Prior notice of ETA and draft must be sent to obtain a pilot.

The pilot vessel is a tug with a black hull, buff superstructure, and a buff funnel with a black top. In addition to the usual signals for a pilot vessel, a searchlight is flashed from time to time at night. The pilot boat maintains radio watch on VHF channel 16 when on duty.

Vessels dock and undock during daylight hours only, except for special circumstances.

**Anchorage.**—Vessels anchor in the charted anchorage area E of Perigee Rock. Tidal currents have been reported to reach a rate of about 6 knots at springs.

To prevent yawing during spring tides, consideration should be given to the use of a second anchor and/or steering. The second anchor should be heaved up and dropped 1.5 hours before and after the tidal current change to avoid fouling the first anchor. It is recommended that engines are kept on standby, to be available within 20 minutes, during spring tides.

**Directions.**—No directions are given due to the frequent changes in the channels and banks, and local knowledge is necessary.

A wide berth should be given the area around Perigee Light Vessel due to extensive silting.

Lock Gate Surge is unusual in that it is lifted vertically before being swung clear. Successive heights of tide at HW during springs can vary by up to 2m, resulting in unequal water levels. The initial lock gate lift, at any time between 2.5 hours and 0.5 hour before HW, can cause a surge within the dock basin and attention to moorings and gangways during this period is recommended.

## Gulf of Cambay—East Side

**2.14 Suvali Point** (21°05'N., 72°38'E.), the E entrance point of the Gulf of Cambay, is fringed by the drying coastal reef which extends about 1 mile W of the point. Tapti Light is shown from a white circular stone column, 27m high, on the point; a tomb lies close SE of the light structure.

The coast from Suvali Point to the entrance of Tena Creek, about 8.3 miles N, is fringed by a drying coastal reef. About 5 miles N of Suvali Point there are some sandhills, known as Suvali Hills.

Between the entrance to Tena Creek and the entrance to Sena Creek, about 9 miles N, the coast is fringed with thick groves of palmyra trees. The Kim River, about 2 miles farther N, dries in its entrance.

Tena Bank—Outer Bhagwa Sand, one continuous narrow bank nearly parallel with the coast, lies between the entrance to Tena Creek and the S entrance of the Kim River. Tena Bank, the S part of which dries, is a continuation of Outer Bhagwa Sand, the N part of which dries in patches. Bhagwa Channel, E of the above bank, is used only by small vessels with local knowledge.

Dani Point Light is shown from a steel framework structure, 26m high, about 2.5 miles SE of the entrance to the Sena River.

Gulwala Bank, with depths of less than 11m, extends about 6.3 miles S from a position about 3.5 miles W of the S entrance point of the Kim River. There is a drying patch near its N end.

Between Gulwala Bank and Tena Bank and Outer Bhagwa Sand there are several shoals with depths of less than 5.5m. The intricate navigation required to pass through the channel E of Gulwala Bank, with its rapid tides, should not be attempted without local knowledge. At night, or in a large vessel, it is necessary to keep well W of Gulwala Bank.

The coast between the entrance of the Sena River and Luhara Point, about 18 miles N, is low and marshy. It is intersected by several streams and rivers, and is flooded at spring tides from 1 to 4 miles inland.

The Narmada River flows into the Gulf of Cambay, S of Luhara Point, through a wide estuary in which there are extensive sandbanks which dry and are subject to change. The river itself also contains many sandbanks with channels between them, which are mostly shallow and very intricate.

Alia Bet, low and covered with small scrub, lies in the middle of the estuary.

An oil derrick is situated in the S part of the estuary, about 8.5 miles S of Luhara Point.

Mariners should navigate with caution off the S part of the estuary of the Narmada River, as the depths have changed considerably.

**Tides—Currents.**—The tidal currents on the E side of the Gulf of Cambay set in a NE direction with the flood tide and in

a SW direction with the ebb, except when their direction is altered by the sand banks.

**2.15 Luhara Point** (21°39'N., 72°33'E.), the N entrance point of the Narmada River, is the highest ground in the vicinity; the land is generally low, and consists of sandhills covered with trees. The highest sandhill, about 24m high, rises just within Luhara Point. Luhara Point Light is shown from a white tower with red diagonal stripes on the point.

The drying coastal bank extends about 2.5 miles SSW, and about 1.3 miles W of the point. Bar Sands, which dry, lie close S of the S edge of the coastal bank, and are marked W by a red conical buoy.

Bharuch Roads is the roadstead W of the entrance to the Narmada River. The anchorage is unprotected, but the bottom is good holding ground of sand and mud. At the anchorage the tidal currents set N with the flood and S with the ebb; the flood runs for about 1 hour after the time of HW.

Anchorage in Bharuch Roads can be obtained, in 16.5m, with the light structure on Luhara Point bearing 024°, distant 4.5 miles and the light structure on Piram Island bearing 272°.

The Narmada River, which is tidal for about 55 miles, can only be navigated by vessels drawing more than 1.8m between half flood and half ebb, and then only if possessing local knowledge.

Pilotage for the river can generally be obtained off the bar of the river.

Kerselea Bank, lying between Luhara Point and Alia Bet, is an extensive area of mud and sand, which dries up to 5.5m.

Bharuch Channel, the principal entrance of the river, leads W and N of Kerselea Bank. Vessels can pass either N or S of Bar Sands.

**Tides—Currents.**—The flood current entering the Narmada River flows until about 1 hour after the time of HW, and sometimes attains a velocity of 5 to 6 knots. The ebb sets out strongly and runs occasionally until 1 hour after the time of LW. During the flood tide there are heavy overfalls on the outer edge of the bar.

**2.16** The coast between Luhara Point and Ban Creek, about 4.5 miles N, consists of moderately high sandhills. Then to the entrance to the Dhadar River, about 7.5 miles farther NNE, the coast is low and composed of sand and mud.

Dahej and Gandhar, about 3.8 and 15 miles, respectively, NNE of Luhara Point, are the only large villages near the coast. They both have conspicuous buildings, which can be seen from a considerable distance. Dahej is an open roadstead, used for the unloading of bulk fertilizers to barges.

A drying flat extends from 1 to 3 miles offshore between Luhara Point and the S entrance of the Dhadar River. The S part of this flat is steep-to at its W edge.

Anchorage can be taken, in about 18m, with Luhara Point Light bearing 137°, about 5.3 miles.

The Dhadar River nearly dries about 1.5 miles within the entrance; local knowledge is necessary to enter the river.

Devjagan Light is shown periodically from a circular stone column, 13m high, on Tankari Point, the N entrance point of the Dhadar River. A pagoda lies about 0.5 mile NW of the light structure.

Makra Bank, which dries near its center, lies with its SE extremity about 6 miles NW of Luhara Point and about 4 miles offshore. The bank is narrow and extends about 10.3 miles N.

Mariners are warned that owing to frequent changes in the banks and channels in the upper part of the Gulf of Cambay, local knowledge is necessary.

Tankari Road, the roadstead off the entrance to the Dhadar River, can be identified by the light structure and pagoda on Tankari Point. Vessels can anchor with the light structure bearing 047°, distant about 3.8 miles, and the buildings at Gandhar bearing 086°.

The flood current in Tankari Road continues to run for about 1 hour after the time of HW. The greatest velocity of the tidal currents in the roadstead is 6 knots at spring tides.

## Head of the Gulf of Cambay

**2.17** The coast of the W side of the head of the gulf from **Johnston Point** (21°49'N., 72°13'E.) to the entrance of the Bhadar River, about 26 miles NNE, is composed chiefly of mangrove jungle, extending several miles inland. The sand bank fronting this coast dries and extends from 1 mile to 4 miles offshore.

Mal Bank, the S end of which lies about 7.5 miles E of Johnston Point, is a large sand bank lying in the middle of the head of the gulf, and extends about 4 miles N.

There are channels on the either side of Mal Bank, each about 1 mile wide in the fairway, but local knowledge is necessary. Malcolm Channel is the W channel.

Khambhat Channel leads NE into the estuary of the Mahi River from the N end of Mal Bank. **Khambhat** (22°18'N., 72°37'E.), the chief town in the area, lies on the N side of the estuary of the Mahi River.

Storm signals are shown at Khambhat; the [Brief System](#) is used.

Bore Rocks, with depths of less than 1.8m, lie about 6.5 miles SE of the entrance to the Bhadar River, on the NW side of Khambhat Channel. They lie on the N entrance of a channel that leads between the banks at the entrance of the Sabarmati River.

The shores of the Sabarmati River are rather elevated and well-cultivated. **Sikotar Mata** (22°19'N., 72°24'E.) is a pagoda, 5.8m high, with a flagstaff, on the E entrance point of the Sabarmati River.

In the upper part of the Gulf of Cambay, the tidal current sets NE with the flood into the Mahi River, and SW with the ebb, with a velocity of 4.5 to 6 knots.

Tidal bores form near the entrance to the Sabarmati River; one travels up that river while another travels up Khambhat Channel and the Mahi River. Each sweeps through the channels as a line of disturbed and breaking water, and tends to alter the configuration of those channels.

In the Mahi River, the bore may be as much as 2.4m high, and attain a velocity of 10 knots at the highest spring tides. The magnitude of the bore varies with the range of the tide. The bore is not perceptible at neap tides, but becomes increasingly prominent as spring tides approach. The bore preceding the higher HW is greater than that preceding the lower of two successive HWs.

The bore in the Sabarmati River is similar but less pronounced.

The flood current commences at a great velocity with the passage of the bore, then decreases in strength for a time, and finally attains its full strength about 45 minutes after the passing of the bore.

## Gulf of Cambay to Daman

**2.18** In the N part of the coast, between **Suvali Point** (21°05'N., 72°38'E.) and Daman, is an alluvial belt through which the Tapti River forms a deep and fertile delta. Along the S part of this coast are small hillocks of drifted sand; the coast in some parts is watered by springs and covered with a thick growth of creepers and date palms. Through the river mouths and inlets the tide runs up behind the sandhills and floods a large area of salt marshes. The rise of the tide renders these rivers and inlets accessible at HW, but local knowledge is necessary.

The Tapti River lies between Suvali Point, previously described in [paragraph 2.14](#), and the N entrance point of the Mindhola River, about 3.5 miles E. The river and its entrance are encumbered with numerous sandbanks, several of which are dry. The river is tidal for 15 miles, and small craft can ascend the river to Surat, about 14 miles above the entrance. A vessel of 1.8m draft can only navigate in the river at more than half-tide.

Directions for entering the river cannot be given, as the sands and channels are continually changing; the navigable channel can only be pointed out by local pilots. The bar dries, but there is a spring rise of about 6.1m, and off the city of Surat there is a pool with depths of from 3.7 to 5.5m.

Magdala is a lighterage port 5 miles within the Tapti River on the S bank, with a 107m long wharf.

Storm signals are shown at Magdala; the [Brief System](#) is used.

Surat lies in a bend on the E bank of the river and extends about 1.5 miles along the river front. A splendid girder bridge spans the river at the city.

Surat Roads is the name given to the anchorage off the entrance of the Tapti River, about 2 miles SW of Suvali Point.

**Tides—Currents.**—The flood current sets N and continues to run for 1 hour after the time of HW. At the outer anchorage, during springs, the tidal currents are very strong, especially the ebb, which sets S at a velocity of 4 to 5 knots; nearer the bar the tidal currents are weaker. The tide frequently falls more than 1.8m before the tidal current turns S.

**Directions.**—Vessels bound for Surat Roads from the S should, from abreast Daman, set course for the roads, keeping in depths of 9.1 to 18.3m.

Between the Mindhola River and the Purna River, about 9 miles SSE, there is a low sandy plain with some scattered palmyra trees. A black beacon, 14m high with white bands, lies on the N entrance point of the Purna River.

Warsi Borsi Light is shown from a white, square, concrete tower with red bands 0.6 mile NNW of the entrance point of the Purna River.

A tomb, with a white dome about 3.5 miles farther SE, is conspicuous among the dark green trees, especially when seen from the SW.

The entrance to the Ambika River lies about 10.5 miles SSE of the Purna River. Kanai Creek lies just N of the entrance to

the Ambika River. Kanai Creek Light is shown from a white, round, concrete tower with concrete tower with black bands 0.6 mile NW of the N entrance point of the creek. The **Auranga River** (20°38'N., 75°53'E.) flows into the sea through Bulsar Khari, a creek. A light is shown on the S entrance point of Bulsar Khari. Hills, about 31m high, are about 5.5 miles NE of the light structure and about 5 miles inland. Shoals, with depths of less than 1.8m, lie about 3.5 miles W, and 4.3 miles SW, respectively, of Bulsar Khari. A 5.8m patch lies about 9 miles WSW of Bulsar Khari.

Anchorage can be taken by large vessels, in 7.3 to 9.1m, about 8.5 miles W of the entrance to Bulsar Khari.

The Par River flows into the sea through Umaradi Creek, about 6 miles S of Bulsar Khari. Parnera Hill, 184m high with a fort on it, lies about 3.5 miles ENE of the creek entrance.

**2.19 Daman** (Damoa) (20°25'N., 72°50'E.) lies on both sides of the Damanganga River; it can be identified by the forts on either side of the river entrance and by two square steeples and its white buildings. Other landmarks are a 109m hill, with an idgah, or Mohammedan place of prayer, on its summit, about 2.8 miles NE of the river entrance; Indragad Hill, 108m high, with a fort in ruins on its summit, about 3.3 miles SSE of the river entrance; and Jogmari Hill, 231m high, about 2 miles farther SSE.

Daman Light is shown from a white masonry tower on the bastion of the fort on the S side of the entrance.

The bar at the mouth of the Damanganga River is flat, mostly hard sand, except N of the N point of the river entrance, where the rocky ground projects some distance offshore; the bar has 0.3m or less over it.

Vessels not exceeding 500 grt sometimes enter the river at HW in fine weather and moor abreast the forts, where there were depths of 4.1 to 5.2m, soft mud. Local knowledge is necessary.

Anchorage can be taken, in 9m, about 4.5 miles W of the river entrance.

## Daman to Bassein Creek

**2.20** The coast between Daman and Vadhavan Point, about 30 miles SSW, is bordered by extensive reefs and foul ground extending up to 4 miles offshore. Vessels should not approach this coast in depths of less than 18.3m when navigating in the vicinity.

Between Daman and Umbargaon, about 13 miles SSW, the coast is low, fringed with bushes, and backed by several conspicuous hills. Indragad Hill and Jogmari Hill were described with Daman. Dhodi Phar, 148m high, is conspicuous about 7 miles S of Daman. Patia Hill, 98m high, lies about 3.3 miles SW of Dhodi Phar.

A light is periodically shown from a white framework tower, 10.7m high, at Maroli, about 6 miles N of Umbargaon.

**Umargam** (Umbargaon) (20°12'N., 72°45'E.), a small town with a ruined tower, lies on the S side of the entrance of the Varoli River.

Umargam Light is shown from a white concrete tower with red bands, close SSW of the ruined tower.

Storm signals are shown at Maroli and Umargam; the [Brief System](#) is used.

A partially-wooded range, the summits of which are conspicuous from seaward, lies from 7 to 12 miles inland, between Umargam and Mahim, about 34 miles S. High Land of St. John, a rounded mountain 540m high, slopes gradually N and S from its center about 9 miles SSE of Umbargaon. Muslia (Maha Luxmi), about 9.5 miles SE of the High Land of St. John, has a pointed summit, 458m high. Kaldurg Fort, about 6 miles NE of Mahim, is 468m high and resembles a castle when seen from NW.

The coast between Umargam and Gulur Point, about 8 miles S, is low and sandy. The latter point is low and covered with coconut trees. A detached 9.4m rocky patch lies 6.5 miles offshore, 6 miles NW of Gulur Point.

**Dahanu** (19°59'N., 72°43'E.) is a village on the N side of the entrance of Khonda Creek. A light is shown at Dahanu.

Vadhavan Point, about 4 miles farther SW, is low and covered with mangrove bushes. Foul ground extends nearly 2 miles W and about 2.8 miles SSW of the point.

**2.21 Tarapur Point** (19°50'N., 72°39'E.) is bordered by foul ground extending about 0.8 mile W; a narrow reef extends about 2.8 miles NNW from the N extremity of the point. A light is shown from a white square masonry tower, 22.8m high with black bands, on the N extremity of the point.

Tarapur Harbor, formed by the barrier reefs extending SSW from Vadhavan Point and NNW from Tarapur Point, is only accessible to small coastal vessels.

The coast between Tarapur Point and Satpati, about 7.5 miles S, is low, rocky, and densely wooded. Vessels should not proceed into depths of less than 14.6m off this part of the coast.

A light is shown at Satpati and at Nawapur, about 3.5 miles N. Storm signals are shown at Nawapur; the [Brief System](#) is used.

The village of **Mahim** (19°39'N., 72°43'E.) lies on the coast, about 5 miles SSE of Satpati. Kelve, about 2 miles farther S, lies on the N side of the entrance of Danda Creek. A small detached rock, with a fort on it, lies just off the entrance of the creek. A light is shown at Kelve.

A detached 5.5m patch lies about 4 miles WSW of Mahim. Drying reefs extend about 2 miles off this part of the coast.

Ussapur Rock, 16m high, lies on the coastal reef about 4 miles S of Kelve, and about 0.5 mile offshore. Drying rocks extend about 1 mile W of the rock.

**2.22 Arnala Island** (19°28'N., 72°44'E.), 4m high with a fort on it, lies about 0.5 mile offshore, and is fringed by rocks on all sides. Shoal water, with depths of less than 5m, extends about 1 mile W of the island. Arnala Island has been reported to give good radar returns at 27 miles.

Arnala Light is shown from a white framework tower on the coast, abreast the S end of Arnala Island.

Agashi Bay, entered N of Arnala Island, is very shallow, encumbered by shoals, and can only be navigated by a small vessel at about the time of HW.

The coast between the low point abreast Arnala Island and the N entrance of Bassein Creek, about 8 miles SSE, is very low; shoal water, with depths of less than 5m, extends about 2 miles offshore.

## Bassein Creek to Bombay

**2.23 Dongri Point** (19°18'N., 72°48'E.), the S entrance point of Bassein Creek, is a bluff point as seen from seaward. It rises to an elevation of 94m about 0.5 mile S of the point, and then slopes gradually to level country about 2 miles farther S.

A light is shown from about mid-September to mid-June.

Poshpir, a rocky islet 13m high, lies about 3 miles NW of Dongri Point.

Drying rocks extend about 2 miles WNW of the same point. When there is no wind the sea does not break on the drying rocks and the sandbanks in the entrance to Bassein Creek, and there are no indications of their existence.

Depths of less than 5m extend about 3.5 miles W of the entrance to Bassein Creek.

North of Bassein Creek there are several landmarks conspicuous from seaward. Girij Hill, a small round hill 53m high, lies about 4.5 miles N of Dongri Point, and about 2 miles inland. Kamandurg, about 9 miles E of Girij Hill, is conical and 652m high. This mountain, with the high land of Salsette Island to S, cannot be mistaken by a vessel N of Bombay.

The conspicuous plateau of Tungar, about 2 miles long in a N-S direction, and attaining an elevation of 662m, is located about 4 miles NNW of Kamandurg.

Bassein Creek, entered between Dongri Point and a point about 1 mile NNE, is a tortuous stream which can be navigated only by small vessels with local knowledge and a draft of not more than 3.7m. The entrance of the creek is al-ways difficult except at slack water, as both flood and ebb cur-rent set across the channel. The sea breaks heavily across the entrance during the Southwest Monsoon.

**Tides—Currents.**—Currents in Bassein Creek attain a velocity of 3 knots at springs, but about 5 miles above the entrance they decreases to 1.5 and 2 knots. In the creek the tidal currents continue to set about 1 hour after the times of HW and LW. Slack water lasts for about 15 to 25 minutes.

Vasai lies about 0.5 mile inland on the N side of the creek. A fort, with the citadel near the middle, lies S of Bassein near the landing place.

Storm signals are shown at Vasai; the [Brief System](#) is used.

The village of Dongri lies on the S side of the creek, about 1 mile SSE of Dongri Point.

**2.24 Panju Island** (19°20'N., 72°51'E.) is connected to the mainland N and S by an iron railroad bridge; the island is low and swampy.

Salsette Island lies between Bassein Creek and Bombay. The mountain range on the island has several conspicuous peaks; the central and highest, **Kanheri** (Khanher Peak) (19°13'N., 72°55'E.), 462m high, lies about 9.5 miles SE of Dongri Point. From the W, Kanheri appears to have a flat summit. Shendur, about 3 miles NNE of Kanheri and the N peak of the island, is a sharp detached peak 459m high.

An aviation light is shown from a 27m tower near the S end of Salsette Island.

The W side of Salsette Island is fronted by islands and islets, which are separated from it by creeks and drying flats. Foul ground extends about 1.5 miles W from these islands and islets.

Dharavi Island, the N and largest of the islands facing Salsette Island, extends from Dongri Point to Manori Point, about 7 miles S. The latter point is a bluff of dark bare rock, 30m high.

Utan Light is shown from a black and white square tower, 12m high, on a salient point about 2 miles SSE of Dongri Point.

Storm signals are shown at Utan; the [Brief System](#) is used.

Gori Rock, a conspicuous sharp black pinnacle, 30m high, about 3.3 miles NNE of Manori Point, and about 1.5 miles inland, forms a good landmark. A temple, with a white dome, lies on the N summit of a round hill, 35m high, about 2.8 miles E of Gorai Rock; the dome is conspicuous from seaward.

High Rock, a sharp pinnacle, 9m high, about 2 miles SW of Dongri Point, lies on a drying reef. Outer Islet, 4m and composed of sand, lies at the S end of this drying reef, about 1 mile S of High Rock.

Green Islet, from 0.9 to 1.2m high, covered with short green scrub and surrounded by a ledge of rocks, lies about 3 miles NNW of Manori Point and about 0.8 mile offshore. Marva Island, low and covered with palm trees, lies close E of Manori Point. Reefs extend about 0.5 mile W of Madh Island.

**2.25 Ambu Islet** (19°08'N., 72°47'E.), at the SW edge of the reefs, is low, covered with palms, and has an old watch-tower on it. Mehti Khada, a small rock, 4.3m high and steep-to on its W side, lies about 0.5 mile W of Ambu Islet.

Madh Island, about 36m high and well-cultivated with coconut and fruit trees, lies close S of Marva Island. There are some ruins on its summit; a fort in ruins stands on its SE point.

Harvey Patches (Hervey Patches), with a depth of 1.8m, about 1 mile S of Madh Island, are marked N by a buoy from October to May. The sea always breaks over Harvey Patches. A dangerous wreck lies about 4.5 miles W of Harvey Patches and is marked close W by a lighted buoy.

Juhu Island, with its S extremity about 4 miles SE of Ambu Islet, has a sandy coast and is covered with coconut and date palms. Andheri Hill, 61m high, isolated and bare, lies about 1 mile E of the N end of Juhu Island.

Uarashi, a reef, lies about 1 mile W of the S end of Juhu Island. A light is shown from October to May on the S end of Uarashi. Some rocks, one of which is awash, lie about 0.8 mile NW of the S end of the reef.

Shoals, with a least depth of 4.6m and 4m, lie about 1.5 miles W and NW, respectively, of Bandra Point, the S extremity of Salsette Island.

The coast between Worli Point, the NW extremity of Bombay Island, and Malabar Point, about 5.3 miles SSW, is fringed by drying reefs and shoal water, with depths of less than 5.5m extending up to 1 mile offshore in the N part and about 0.5 mile off the S part.

A conspicuous TV tower lies at an elevation of 305m, 1.5 miles SSE of Worli Point.

## Bombay (Mumbai) (18°56'N., 72°51'E.)

[World Port Index No. 48840](#)

**2.26** The city of Bombay, on Bombay Island, is the largest city of India and the principal seaport on its W coast. Bombay

Harbor lies between Bombay and Trombay Islands to W and N, and Karanja Island and the mainland to E and S. It is the only natural deep-water port on the W coast of India. The harbor contains several islands, rocks, and shoals, with numerous bays and inlets indenting its shores.

The direction and management of the port, including pilotage, berthing, docking, and wharves under control of the trustees of the port, are vested in the Deputy Conservator.

The facilities of the port are mainly on the E side of Bombay Island. An oil terminal is situated on Butcher Island.

**Port Authority of Bombay (Mumbai)**

<http://www.mumbaiporttrust.com>

## Winds—Weather

Visibility may be reduced by heavy rain during the Southwest Monsoon. A smoky haze frequently hangs over the area from November to March.

## Tides—Currents

The tidal rise at Bombay is 4.4m at MHWS, and 3.3m at MHWN.

The velocity and direction of the tidal currents in the approaches to Bombay are generally as follows, but they are greatly influenced by winds and heavy rains.

Off the SW extremity of Prongs Reef the flood current at first sets ESE and, as the velocity increases, shifts to the NE. Eastward of this reef, as far as Sunk Rock, it sets between NNE and N by E.

Between Thal Shoal and a position about 4 miles WNW, the flood current sets between ESE and ENE, resulting in a more northerly direction as the velocity increases. In East Channel Swatch, E of Thal Shoal, it sets about NNE, taking a more easterly direction as it crosses the mouth of Dharamtar Creek.

On the N side of the entrance the ebb current sets SW from Sunk Rock to abreast the light structure on Prong Reef, where it shifts to between NW and SW, changing to about SSW as the tide strengthens.

On the S side of the entrance of the harbor, the ebb current sets WSW across the entrance of Dharamtar Creek altering to between SW and SSW on nearing Thal Shoal, and still more to the S as it continues S. Between Thal Shoal and a position about 4 miles WNW, it sets about WSW.

The tide does not set fairly through the channel, but the flood sweeps E over the foul ground of Thal Shoal. During rains in the Southwest Monsoon the ebb sets strongly W out of Dharamtar Creek.

The velocity of strong tides between Thal Shoal and Prongs Reef is from 2.5 to 3 knots and perhaps as much as 4 knots during the rains.

On the W shore of the harbor, from Sunk Rock to Cross Island, the flood current sets NE to NNE.

On the E shore of the harbor, the flood current sets NE along the W shore of Karanja Island. It sets NE between Butcher and Elephanta Islands, and then NE toward Trombay Island.

The ebb current sets WSW from the S of the channel between Butcher Island and Elephanta Island and along the W coast of Karanja Island. Abreast Dharamtar Creek, the current sets WSW.

On the W shore, from Cross Island to inside Middle Ground Islet, the ebb current sets SSW, and then to Sunk Rock in a SW direction. From Cross Island to E of Middle Ground Islet, in mid-channel, the ebb current sets from SW to SSW; from there to Sunk Rock it sets SW, but at the first of the ebb the set is more W.

South of Dolphin Rock, the flood current at springs has a velocity of 2 knots and the ebb current 1.5 knots. In other parts of the harbor the velocity is from 0.5 to 1.5 knots.

The ebb current on the W shore of the harbor occur from 30 to 35 minutes earlier than on the E shore, and during strong tides from 40 minutes to 1 hour sooner.

Inshore and near the Indira Dock wall, during the Southwest Monsoon, the ebb current occurs about 45 minutes before the time of HW. This is important for vessels docking.

It has been observed that the flood current divides in the vicinity of Ballard Pier, causing a counterclockwise movement off the naval dockyard, the current taking a S direction near the breakwater pier. Vessels entering the dockyard with a flood current are advised to keep the rear range beacon slightly open N of the front beacon to avoid being set onto breakwater pier.

## Depths—Limitations

There is a least depth of 9.1m in the fairway of the entrance to Bombay Harbor until abreast Sunk Rock Light. A least depth of 9.6m was reported in the entrance channel and approaches to the tanker berths on Butcher Island. The shallowest bar extends from abeam the entrance buoys to abeam Middle Ground Islet. Less water than charted has been reported (1990) S of Sunk Rock.

The main channel, marked by range lights in line bearing about 085°, continues SE of Elephanta Island, and has maintained depths of 10.8 to 11m.

The maximum drafts for alongside berths are subject to change due to siltation and dredging. The Deputy Conservator of Bombay Harbor issues maximum drafts monthly.

**Indira Dock (Alexandra Dock)** has depths of 8.5 to 10.7m alongside. The entrance lock is 228m long and 30.4m wide, with a depth of 8.2m on the outer sill and 7m on the inner sill at LW. The maximum size ship that can enter Indira Dock at HW is 206m in length, with a draft of 9.5m. There are 21 berths inside the basin and five berths along the harbor wall. The dock has five berths equipped for container traffic, three multi-purpose berths, and one general cargo/tanker berth.

In 2002, it was reported that an uncharted rock, with a depth of 7.6m, was located in the center of Indira Dock Approach Channel (18°56'N., 072°50'E.).

Vessels are not handled at night in Indira Dock except under special circumstances. When vessels are entering or leaving the dock by day, a blue flag is hoisted at the flagstaff on Bulls Nose.

**Hughes Drydock** is entered from Indira Dock. It has a maximum length of 304m, a breadth at the entrance of 30.4m, a depth on the blocks at the entrance of 6.3m below chart datum and a depth over the blocks at the entrance of 10.5m at MHWS.

**Ballard Pier**, the continuation of the W side of Indira Dock entrance lock, has a passenger berth, with a depth of 7.6m alongside, and a depth of 10m alongside the extension, but this is liable to vary due to silting. Since completion of the South Breakwater, tidal eddies have been reported by ships berthing at Ballard Pier. It has been reported (1994) that Ballard Pier has been dredged to accommodate vessels up to 228m long, with a maximum draft of 9.1m.

**Victoria Dock**, N of Indira Dock, has an entrance width of 24.3m. The maximum size ship that can enter the dock is 140m in length by day and 122m in length at night, with a draft of 6.1m and a width of 23.5m.

**Prince's Dock** has an entrance width of 20.1m; the width of the passage leading to Victoria Dock, close S, is 19.5m. The maximum size ship that can enter Prince's Dock is 152.1m in length, with a draft of 6.1m and a width of 18.4m. The dock is entered through a 20m wide, 6.6m deep channel.

Ships can be taken into Prince's Dock only from about 2 hours before the time of HW to 30 minutes after the time of HW. They cannot leave the dock after the time of HW because the outgoing current commences in that vicinity about 90 minutes before the time of HW and sets directly down on to the reef N of Cross Island at about the time of HW.

Generally, vessels are only admitted 3 hours before HW. The maximum draft for entering the docks is subject to the tide.

There is a terminal facility situated on the E side of **Butchers Island (Jawahar Dweep)**. It consists of a concrete jetty about 520m long. The jetty has three pier heads, with dolphins at each end of the pier head. The jetty carries a roadway and pipelines and has berths for three vessels of various sizes. The berths are numbered from N to S as No. 1, No. 2, and No. 3, respectively. Each berth is provided with dolphins and mooring dolphins. Tankers up to 70,000 dwt, with a maximum length of 229m and a maximum draft of 11m, can be berthed. A fourth oil berth, lying S of Butchers Island, has been added for loading and discharging of crude oil. The maximum draft of a vessel mooring at No. 4 is 14.3m. Tankers up to 125,000 dwt can be berthed at this pier.

Loaded tankers are berthed at HW. It is compulsory to test astern power during the approach and before berthing at the terminal.

**Pir Pau Pier**, T-headed, at the S end of Trombay Island, is 174m long with a dredged depth of 6.8m alongside. Tankers up to 171m long, with a maximum draft of 5.5m, can be accommodated. Pir Pau Deep, dredged to 5.5m, leads W from W from the channel to the pier.

**New Pir Pau Jetty** has a depth of 11m alongside. Vessels up to 45,000 tons, with drafts of 10.6 to 11.1m and lengths of 97 to 197m, can be accommodated.

In addition to the berths mentioned above, there are a number of "Bunders" throughout Bombay. These open, shallow-draft wharves are used by local smaller vessels to load and discharge cargo.

**Jawaharlal Nehru Port** (18°57'N., 72°57'E.) ([World Port Index No. 48845](#)) is a new port on the mainland SE of Elephanta Island. The maximum draft in the approach channel is 12m for inbound vessels and 12.5m for outbound vessels. The container jetty is 680m long, the breakbulk jetty is 500m long, and the service jetty is 212m long; each jetty has a dredged depth of 13.5m alongside.

The port has been established as a satellite for Bombay and is administered by a separate port authority. The port provides three container berths, two bulk cargo berths accommodating vessels to 80,000 dwt, a ship repair yard, and a linkspan for ro-ro traffic.

**Offshore Oil Development Areas.**—An extensive area of producing oilfields and exploration areas lies off the Indian coast and the approaches to the port of Bombay. Numerous derricks, oil production platforms, wells, SPM, and other obstructions impede safe navigation of the area.

Indian authorities have established recommended routes to aid traffic transiting the area, or bound for the port of Bombay, which may be seen on the appropriate chart.

Vessels are advised not to approach within 2.5 miles of production platforms, and are prohibited from passing within 500m of any installation or structure.

Submarine oil and gas pipelines have been established from some producing fields to the entrance of Bombay Harbor. Vessels should exercise caution when navigating in this vicinity.

Oil wellheads exist in position 19°20'N, 72°03'E and in position 19°44'N., 72°01'E., about 53 and 70 miles NW of entrance to Bombay Harbor. For further information consult Pub. 160, *Sailing Directions (Planning Guide) South Atlantic Ocean and Indian Ocean*.

Transshipment of petroleum products is carried out from large storage tankers moored in the vicinity of position 18°53'N., 72°26'E.

Any vessel in difficulty within 50 miles of any production platform or rig and likely to drift towards platforms or rigs should contact Bombay Radio and standby offshore supply vessels on VHF channel 16 for assistance.

**Bombay High Oil Field Development Area.**—This area is situated with its center about 90 miles WNW of the entrance to Bombay Harbor. The area extends 25 miles in an E-W direction and 47 miles in a N-S direction and contains numerous production platforms within. Three lighted tanker mooring buoys are situated close together in the N part of the area. Flares are lit from this vicinity. Another lighted tanker mooring buoy is situated 10 miles SSE of the above buoys. Oil and gas pipelines are laid ESE from the center of the oilfield to Bombay.

**Mukta Panna and Bassein Oil Field Development Area.**—This area is situated with its center 50 miles NW of the entrance to Bombay Harbor. The area extends 21 miles in an E-W direction and 33 miles in a N-S direction. Submarine oil and gas pipelines from Bombay High Oil Field are laid passing through the center of Bassein Oil Field Area with a gas pipeline branching 115 miles NNE to Danti at the **Mindhola River** (21°04'N., 72°43'E.).

**Neelam Heera and Ratna Oil Field Development Area.**—This area is situated with its center about 40 miles SW of the entrance to Bombay harbor. The area extends 14 miles in an E-W direction and 40 miles in a N-S direction.

**Recommended Routes.**—In the approaches to Bombay, recommended routes are charted to assist mariners to navigate safely in the vicinity of the development areas. One route leads in an E-W direction, passing S of Bombay High Oil Field Development Area and Mukta Panna and Bassein Oil Field Development Area and N of Neelam Heera and Ratna Oil Field Development Area. Other routes lead in NNE-SSW directions,

passing W and E of Neelam Heera and Ratna Oil Field Development Area.

Mariners are advised to keep 1 or 2 miles to starboard of the centerlines of these routes in the approaches or departure from Bombay, and to be consistent with the 72 COLREGS.

A circular lightering area, best seen on the chart, is located about 22 miles W of Malabar Point. All vessels are advised to maintain a continuous listening watch on VHF channels 6 and 19 and to give the area a wide berth.

Direction Bank, with its N end about 39 miles WSW of the SE entrance point of Bombay Harbor, extends about 27 miles in a S direction, and has depths of 37 to 64m, coarse sand and small shells. East of this bank, the depths decrease gradually from about 55m, off its E edge, towards the coast.

Vessels approaching Bombay from the N of Direction Bank will run a considerable distance before the depths will decrease from 73m to 55m, but the depths will then decrease rapidly to 37m, which depth is found about 15 miles W of **Khanderi Island** (18°42'N., 72°49'E.) or the light structure on Prongs Reef, about 10.5 miles farther N.

A vessel approaching this bank from the W will pass over Fifty Fathoms Flat, then gradually shoal to depths of 73m, and then suddenly to 55 and 42m over Direction Bank. After crossing the bank the depths will again increase to more than 55m over the greater part of the bank, and to about 50m at its S end.

Approaching Bombay from the SW, if the vessel is S of Direction Bank, the depths will decrease rapidly from 73m to 55m, and continue between 55 and 37m for some distance until the latter depth is obtained about 17 miles offshore.

## Aspect

In clear weather, the high peak of **Malangar** (19°06'N., 73°11'E.), 789m high, is conspicuous in the offing. On the summit of this peak is an enormous perpendicular cliff, topped by a fort in ruins.

On nearer approach Kanheri and Shendur, on Salsette Island on the N side of the harbor, and Kankeshwar and the Sagara-garh Range, on the S of the harbor, can be seen. Kanheri and Shendur were previously described with Salsette Island in [paragraph 2.24](#).

Kankeshwar, a mountain 384m high, lies about 26 miles SW of Malangarh. It is separated by a valley from a thickly-wooded range of hills which extends along the SE side of the entrance of Bombay Harbor.

Thal Knob, 54m high with a conspicuous white beacon, 18m high on its summit, lies about 4.3 miles NW of Kankeshwar. False Knob, about 0.5 mile SSW of Thal Knob, is similar in appearance, but somewhat lower. In thick weather these hills, being detached from the more distant highland, stand out well among the coconut trees.

Ashuerra Hill, 243m high, about 3.5 miles ESE of Thal Knob, has two hummocks named The Paps. A black beacon, 24m high, lies on North Pap.

Sheva Beacon lies on a drying reef at the S end of the port. **Nhava Island** (18°58'N., 72°57'E.) lies close E of N breakwater head.

**Gull Islet** (Kansa Rock) (18°50'N., 72°54'E.), 6.1m high and marked by a lighted beacon, 20.4m high, lies about 2.3 miles NNE of Thal Knob.

Karanja (Great Karanja), 302m high, is a long and flat-topped hill at the S end of Karanja Island, about 2.8 miles ENE of Gull Islet. The S side of this hill is steep and almost inaccessible, but the N side slopes gradually from its base to a peak on which there is a ruin. A conspicuous flare chimney lies at the SE end of the island; a conspicuous tower lies on the SW slope of Kharavli, a 214m hill near the NW extremity of the island.

Kharavli, 212m high at the N end of Karanja Island, about 2.8 miles NNW of Karanja, is formed by the junction of 4 ridges and has a very sharp summit.

Fifty Fathoms Flat, lying between 60 and 120 miles W of Bombay, is an extensive bank with depths of 82 to 92m, fine sand, although a muddy bottom has occasionally been found between this bank and Direction Bank.

Bombay Island consists of a low-lying plain, flanked by two parallel ridges of low hills. The city consists generally of well-built houses and broad streets, with many fine public buildings. The most conspicuous of these is the Taj Mahal Hotel, surmounted by a dome 70m high, about 2 miles NE of Colaba Point. Among the conspicuous buildings in the densely built tract known as The Fort, W of Indira Dock, are the cathedral and the municipal buildings, the tower of which is 71m high. Another tower, with a white dome 53m high, lies about 1 mile farther N.

A clock tower, 85m high, about 0.5 mile NNW of the Taj Mahal Hotel, is conspicuous among the prominent buildings on the esplanade on the E shore of Back Bay.

A conspicuous chimney, 54m high, and the spire of St. John's Church, 55m high, lie on Colaba Peninsula, about 0.7 mile SSW, and 1.3 miles SW, respectively, of Taj Mahal Hotel. The Naval signal station, with a flagstaff, is prominent near the root of the S breakwater.

**Khanderi Island** (Khanhoji Angre Island) (18°42'N., 72°49'E.), S of the harbor entrance and about 2.5 miles offshore, has two hills, on the S and higher of which lies the light-house with a flagstaff NE of it. The island, sparsely covered with trees and scrub, is surrounded by the remains of a wall. A rock drying 3.8m, marked by a beacon 3m high, lies 0.2 mile NE of Khanderi Island. Leading lights are shown on the E side of Khanderi Island, 1.3 miles NE of the main light; when in line bearing 168° they lead W of the drying rock and to the landing place.

**Bombay Lightship** (18°50'N., 72°44'E.) is moored nearly 5 miles SW of Prongs Reef Light; it is removed and replaced at irregular intervals. It has been reported that Bombay Lightship has been off-station for an extended period. A wreck area, best seen on the chart, lies S and SW of the lightship. A depth of 11m and a wreck, with a depth of 11m, lie 4.5 miles W and 2.8 miles S, respectively, of the lightship.

**Colaba Point** (18°54'N., 72°49'E.) is the S extremity of the Colaba Peninsula, a narrow peninsula extending SW from Bombay Island. The peninsula is covered with buildings which continue N in an unbroken line and connect with the more thickly settled part of the city. A spoil ground lies 4 miles WSW of Colaba Point.

Prongs Reef, which dries, extends about 1 mile SSW from Colaba Point. **Prongs Reef Light** (18°53'N., 72°48'E.), a prominent visual navigation aid, is shown from a round tower, 52.5m high, painted in red, white and black horizontal bands near the S end of Prongs Reef. Foul ground extends about 1

mile SW, SE, and E of the light structure. The light structure is reported to be a good radar target at 17 miles. A dangerous wreck, with masts above water, is situated 5.5 miles SW of Prongs Reef Light, with another dangerous wreck 0.4 mile NNE from it. The area is considered foul and dangerous to navigation.

Malabar Point, about 3 miles NNW of Colaba Point, and Malabar Hill, about 1 mile farther NE, have been reported to give good radar returns at 22 and 39 miles, respectively.

Khanderi Island Light, about 10.5 miles S of Prong Reef Light, is shown at an elevation of 47m from an octagonal tower, surmounting a flat-roofed house, 31.5m high, on the summit of Khanderi Island. It is connected by telephone with Bombay. If a vessel is seen to be lying into danger, a warning rocket signal is fired, and the International Code signal U, "You are standing into danger," is displayed.

Khanderi Island has been reported to give good radar returns at 17 miles.

Foul ground and shoal water extend about 3 miles offshore between Khanderi Island and the SE entrance point of Bombay Harbor. Thal Shoal, about 6 miles N of Khanderi Island and 2.5 miles offshore, is composed of sand and rock, with several detached heads, and a least depth of 4.3m. A black conical buoy is moored off the W side of Thal Shoal.

Thal Reefs, SE of Thal Shoal, consists of numerous reefs and rocks extending about 1.5 miles offshore. Detached shoals, with depths of less than 5.5m, lie within 1 mile W of Thal Reef. A prohibited area, best shown on the chart, lies close N of Thal Shoal.

East Channel Swatch, with a least depth of 5.8m, lies between Thal Shoal and the detached shoals W of Thal Reef.

SW Prongs Lighted Buoy, moored about 1.5 miles SSW of Prongs Reef Light, marks the edge of the shoal water SW of Prongs Reef.

A lighted buoy moored about 1.5 miles SE of Prongs Reef Light marks the N side of the fairway into the harbor.

**Sunk Rock** (18°53'N., 72°50'E.), awash and marked by a light, lies about 1.3 miles E of Colaba Point. A stranded wreck, marked by a lighted buoy, lies 2.3 miles SE of Sunk Rock. Another dangerous wreck, marked by a lighted buoy, lies 1.8 miles S of Sunk Rock.

Oyster Rock, about 0.8 mile ENE of Sunk Rock, is flat and 21.5m high; a tower, with an elevation of 28m, stands on it. Fishing stakes extend about 0.5 mile E of Oyster Rock; care is necessary when navigating in this vicinity, as the stakes are often broken off just below-water.

Dolphin Rock, nearly steep-to on its E side and marked by a light, lies about 1.5 miles N of Oyster Rock.

Middle Ground Islet, rocky and about 12.5m high, lies about 0.8 mile ENE of Oyster Rock; two towers, with an elevation of 17m, lie on the islet. Shoal water extends about 110m SW and 0.2 mile NNE, respectively, from the islet.

Range lights, in line bearing 305°, on Ballard Pier, about 0.5 mile farther N, lead through the middle of the approach channel to the pier.

The Naval Dockyard lies about 0.5 mile NW of Middle Ground Island. South Breakwater, marked at its head and root by towers having an elevation of 58m, forms an enclosed area E of the Naval Dockyard. The Naval Signal Station, with a flagstaff, is conspicuous near the root of South Breakwater.

Cross Island, 19.5m high, lies about 1.8 miles farther N, and about 0.3 mile off Victoria Dock.

The N side of the harbor is occupied by an extensive coastal bank, with depths of less than 5.5m.

Tucker Beacon, about 1.8 miles ENE of Middle Ground Islet, marks the S edge of the bank. The beacon is a cylindrical structure, painted in red, white, and black horizontal bands, and shows a light.



*Courtesy of mumbaiporttrust.com*

**Tucker Beacon**

Gull Islet (Kansa Rock) lies off the entrance to Dharamtar Creek, on a bank filling the SE part of Bombay Harbor. Gull Islet Light is shown from a framework tower on the summit of the islet.

Karanja Reefs, farther N, extend about 2 miles off the W side of Karanja Island. Karanja Beacon, a black steel structure, 8.5m high, surmounted by a cone, lies near the NW edge of the reefs, about 5 miles N of Gull Islet.

Two spoil grounds, the N marked approximately 0.5 mile NNW by a lighted buoy, are situated between South Karanja Buoy and Karanja Reefs.

A dangerous wreck, marked by a buoy, lies about 1.5 miles SW of Karanja light.

**Butcher Island** (Jawahar Dweep) (18°58'N., 72°54'E.), 20m high, with an oil terminal on its SE side, lies about 5 miles NE of Middle Ground Islet. A conspicuous water tower, with an elevation of 31m, stands near the center of the island.

Butcher Rock, steep-to on its S and E sides, lies about 0.6 mile S of Butcher Island and is marked by Butcher Beacon, a

red stone beacon, 8m high, from which a light is shown. A breakwater, extending NNW from Butcher Rock, is 3m above chart datum and uncovers at half tide.

Elephanta Island, 174m high, about 1 mile E of Butcher Island, is wooded with two hills separated by a ravine.

Elephanta Patch Beacon, from which a light is shown, lies about 0.5 mile NW of Elephanta Island.

The channel leading ENE and NNE between Butcher and Elephanta Islands is marked by ranges. Range lights, shown on the SW side of Elephanta Island, in line bearing 055°, lead between the shoals on either side of the channel. This range intersects with a lighted range leading NNE, which is in line bearing 203°, astern. The rear light of the latter range is shown from a lighted beacon on **Uran Shoal** (18°56'N., 72°54'E.).

Trombay Island, N of the harbor, attains an elevation of 305m at **Trombay Peak** (19°02'N., 72°55'W.). There are several oil refinery chimneys on the S side of the island; the flares from these chimneys are conspicuous and visible from seaward.

Pir Pau Tomb, a conspicuous mosque with a white dome, 24m high, stands on the S extremity of Trombay Island. A white dome, 42.5m high, and a chimney, 125m high, are conspicuous about 0.5 mile farther NNE.

Radio masts, each marked by red lights, stand on the SW end of Trombay Island.

## Pilotage

Pilotage is compulsory in Bombay for all vessels over 100 tons and is available 24 hours. The pilot boards about 1.5 miles S of Sunk Rock Light. Pilots can be contacted on VHF channel 12, 14, or 16.

Pilotage is compulsory in Jawaharlal Nehru for all vessels over 200 tons and is available 24 hours. The pilot boards about 1.5 miles S of Sunk Rock Light. Pilots can be contacted on VHF channel 13.

During monsoon conditions, pilots will board inside the channel.

If awaiting a pilot, vessels may anchor, draft permitting, SE of Sunk Rock Light structure.

## Regulations

A Vessel Traffic Service controls traffic to Bombay and the Jawaharlal Nehru Port. When arriving within a distance of 24 miles from Prongs Light, vessels must register their approach by contacting Bombay Vessel Traffic System on VHF channel 14. In addition, vessels bound for the Jawaharlal Nehru Port must contact that port on VHF channel 13.

**Bombay.**—Vessels should send their ETA 7 days, 5 days, 3 days, 2 days, and 1 day prior to arrival, via the agent. The 5-day message should contain the following information:

1. Master's name
2. Vessel's ETA.
3. Present loaded displacement, draft, grt, and nrt.
4. Ports visited in last 30 days.
5. Distance of manifold from amidships.
6. Cargo quantities on board.
7. Supplies and cash requirements.

The ETA should be confirmed on VHF channels 16, 14, or 12 at least 3 hours prior to arrival.

**Jawaharlal Nehru.**—Vessels should send their ETA 7 days, 5 days, 3 days, 2 days, and 1 day prior to arrival, via the agent. The 5-day message should contain the following information:

1. Vessel name.
2. Master's name
3. Port of registry.
4. Last port of call.
5. Length overall.
6. Gross tonnage.
7. Type of vessel.
8. Maximum draft in meters.
9. Class of dangerous cargo.
10. Any defects.

The ETA should be confirmed on VHF channels 16, 14, or 12 at least 3 hours prior to arrival.

## Signals

A naval signal station at Colaba Point may call up vessels by signal lamp, which they are required to answer by the same system.

Vessels liable to quarantine or carrying certain types of dangerous cargo are required by Bombay Port Rules to make certain signals to Prongs Reef Lighthouse; these are answered by day by corresponding signals at the lighthouse.

The Port Signal Station is in a tower on the E side of Ballard Pier. The docking signal station is on Bull's Nose at the entrance to Indira Dock. The Naval Signal Station lies about 0.5 mile SW of the Port Signal Station.

Communication is by the International Code of Signals, by signal lamp at night, or by VHF radiotelephone.

Storm signals are displayed from the port signal station and from a flagstaff at the NE corner of Victoria Dock; the **General System** is used. See Pub. 160, Sailing Directions (Planning Guide) South Atlantic Ocean and Indian Ocean for further information.

## Anchorage

Vessels usually anchor on the W side of the harbor, abreast Bombay, in depths of 6.7 to 11.3m, but good anchorage can be obtained in other parts of the harbor.

Deep-draft vessels should anchor about 7 miles W of Prongs Reef, outside the 20m curve, in mud and shingle, reportedly good holding ground, awaiting berthing instructions.

As a general rule, vessels in the harbor should be moored in a SSW-NNE direction between October 1 and May 31 with 82m of cable each way, and between June 1 and September 30 with 109m on the S anchor, and 82m on the N anchor; vessels moored in the eddies off Middle Ground Islet should have 137m on the S anchor.

An area reserved for naval vessels lies between Sunk Rock, Middle Ground Islet, and the Naval Dockyard.

Vessels subject to quarantine may be instructed to anchor in a position convenient for the health officer to board.

Anchoring and fishing are prohibited in the vicinity of the pipelines. Anchoring is prohibited in an area in the harbor en-

trance extending approximately 5 miles E from Bombay Lightship.

## Directions

Vessels may approach Bombay from N to S through W, but attention must be paid to areas in which fishing stakes may be encountered, as indicated on the chart. In 1987, it was recommended for vessels to pass N of Bombay Lightship in order to avoid the spoil ground and fishing stakes lying W of Thal Shoal and the foul area.

The harbor entrance lies between lighted buoys moored N of Thal Shoal and SE of Prongs Reef, 2.5 miles NW of the shoal.

If approaching from the NW, keep North Pap Beacon (18°46'N., 72°56'E.) in line with Thal Knob Beacon, on a bearing of 121.5°, which leads close SW of SW Prong Lighted Buoy. If approaching from the S, pass W of the buoy marking Thal Shoal.

During the Southwest Monsoon, when it may be difficult to identify marks, or during the cold weather, when a smoke haze often reduces visibility, the best time to make Bombay is about 1 hour before sunrise, when the lights are still visible.

## Caution

In the approach to Bombay, either from N or S, lines of strong fishing stakes, surmounted by baskets, which project about 6.1m out of the water, may be encountered anywhere in depths up to 18.3m and sometimes up to 22m.

In the immediate approach to the harbor, within the area shown by dashed lines on the charts, no fishing stakes are permitted, but even within this area they are sometimes placed, and so may be encountered before the port authorities have been able to remove them.

Occasionally the heads of the stakes are broken off at the waterline and then they may not be seen above water.

All fishing stakes are normally removed each year for the duration of the Southwest Monsoon.

In 2001, it was reported that numerous fishing vessels were anchored directly in the inbound and outbound traffic lanes.

Numerous wrecks, best seen on chart, lie in the approaches, channels, and adjacent waters of the port of Bombay. Mariners should use caution while transiting these waters.

Heavy smog and haze may reduce the visibility in the harbor.

It was reported (2001) that heavy pollution and siltation in the harbor prevented the vessel's depth finder to give accurate readings.

A submarine exercise area is centered 67 miles W of the entrance to Bombay Harbor. Another submarine exercise area is centered between the Fifty Fathoms Flat and Direction Bank, about 75 miles offshore.

Numerous small fishing vessels, with buoyed nets, are likely to be encountered up to 25 miles offshore from Bombay.

A depth of 23m was reported in 1987 close W of the 200m depth contour in approximate position 19°00'N, 69°55'E.

Mariners are advised not to anchor or fish near the pipelines to avoid damaging them.

Submarine oil and gas pipelines are laid from the SW point of Karanja Island, WSW through the entrance to Bombay Harbor and then NW to Bombay High Field.

## Bombay to Cape Rama

**2.27** The coast between **Khanderi Island** (18°42'N., 72°49'E.) and Cape Rama, about 228 miles SSE, consists of sandy bays separated by bold rocky capes. There are a number of river estuaries and it is often bordered by tableland in the middle of its S part. The Western Ghats, which are generally from 609 to 904m high, with some peaks nearly 1,524m high, lie like a wall parallel to the coast at an average distance of 30 miles inland.

The Sagargarh Range, S of Kankeshwar and previously described in [paragraph 2.24](#), has a spur forming two narrow ridges extending W to about 2 miles ENE of Alibag. **Sagargarh** (18°39'N., 72°58'E.), 415m high, and the highest peak of this range, lies about 5 miles E of Alibag. It has a rounded summit and is faced on its S side by high conspicuous cliffs. At the NW end of this range, about 5 miles NW of Sagargarh and 2.5 miles from the coast, are three high bare, and conspicuous peaks. The S of these three is the sharp and conical Parhur, 313m high. Close SE of Sagargarh is a sharp rocky peak; farther S the range is lower and covered with jungle.

**Depths—Limitations.**—Depths in the approach to the coast between Bombay and Cape Rama are fairly deep and clear of dangers, with the exception of Angria Bank.

Angria Bank, with a least depth of 20.1m in 16°43'N., 72°03'E., lies about 65 miles off the coast, and is composed of sand, shells, and coral. The bank is steep-to on all sides, with great depths surrounding it. The tidal currents set NE across the bank during the flood and SW with the ebb, with a velocity of about 1 knot in spring tides.

A volcanic disturbance was reported observed (1949) in an area about 100 miles SW of Angria Bank. Vessels should approach this area with caution.

**Caution.**—Between Khanderi Island and Boria Point, about 80 miles SSE, fishing stakes and logs are liable to be encountered in depths up to 22m.

## Khanderi Island to Murud-Janjira Harbor

**2.28** The coast from abreast Khanderi Island to Alibag, about 4 miles S, consists of a low ridge of sandhills backed by dense groves of palm trees. It is fringed by sandbanks and reefs extending in places about 1.3 miles offshore, and depths of less than 5.5m extend about 3.5 miles offshore. The inner reefs, which lie in narrow ridges parallel to the shore, are joined by low stone walls and are used as fish traps.

Alibag Creek, almost closed by sand, lies S of Alibag. Kolaba Fort, about 0.5 mile SW of Alibag, stands on a drying reef on the NW side of the entrance to the creek. The fort can be recognized by the cupola of a temple in the shape of a pogoda, which is conspicuous from seaward. A light is shown periodically from Kolaba Fort.

Alibag Outer Reef, with a depth of 1.8m, lies about 1.3 miles W of Kolaba Fort, and is marked SW by a red conical buoy from October to May.

Chaul Kadu Reef, a group of rocky patches with a least depth of 2.1m, lies about 2.5 miles farther S. The sea breaks heavily over these reefs at LW. A light is shown from a white

round masonry tower, 19m high, on the NE extremity of the reef.

**2.29 Revadanda Port** (Port Chaul) (18°33'N., 72°55'E.), the estuary of the Kundalika River, is only available to vessels able to cross the bar. In the fairway over the bar there is a depth of 2.1m, but this may be subject to change. The tide flows over a considerable part of the low-lying land on either side of this moderately wide river at HWS. Local vessels call at the port.

Korlai Fort, on the S side of the river entrance, stands on the summit of a reddish-colored headland, connected to the mainland by a low, narrow, and sandy isthmus. The N part of this headland slopes gradually to the sea and terminates in a rocky point. A light is shown from the fort.

Chaul Knob, 255m high, round and conspicuous, lies about 1.8 miles ESE of Korlai Fort, and is the summit of a range of wooded hills.

Revadanda, an old fortress, stands on the N entrance point of the river. The tower of the Franciscan convent, 30.5m high, is conspicuous above the walls of the fort.

A prominent white temple stands 2 miles NE of Revadanda. Another temple is conspicuous on the summit of a 172m hill above the preceding temple. A Muslim tomb stands at a height of 128m, near a group of palm trees, about 0.8 mile NW of the latter temple.

Nine Foot Patch lies about 2.3 miles NW of Korlai Fort. Six Foot Patch lies about 0.8 mile farther S.

An offshore production platform lies about 33 miles W of the entrance to Murud-Janjira harbor.

**2.30 Murud-Janjira Harbor** (18°18'N., 72°57'E.), at the mouth of Rajpuri Creek, is entered between Vihur Point (Yoor Point) and Nanwell Point (Rajpur Point), about 4 miles SSE. The harbor affords good shelter to moderate-sized vessels from all winds except those from W and NW.

**Tides—Currents.**—The tidal rise is 3.9m at MHWS, and 3m at MHWN. Tidal currents have a velocity of 1 knot to 1.5 knots at springs.

**Depths—Limitations.**—Depths of less than 5m extend about 10.3 miles S of Kansa Fort.

Whale Reef, about 1.3 miles WSW of Nanwell Point, dries 3.3m. Shoal water, with depths of less than 5m, extends about 0.5 mile WNW, and 0.3 mile S of the reef.

Fishing stakes, consisting of large poles or stripped palm trees, may be met within the harbor, but they normally show well above HW.

**Aspect.**—The coast in the vicinity of the harbor is hilly and well-wooded, with high ranges behind the coastal hills.

A peninsula with two conspicuous peaks lies on the S side of the harbor. Conical Hill, 232m high and bare, and Round Hill, 231m high and thickly wooded, lie about 2 and 3 miles, respectively, SSE of Nanwell Point. Dighi Hill, about 1.5 miles SE of the same point, is 250m high and the highest point of the peninsula.

Dighi, a village on the S shore of the Rajpuri River, has a bight SE of it fringed with mangroves; a drying mud flat fills the bight. There is a jetty at Dighi and a small sugar exporting port is planned.

Nanwell Point Light is shown from a white masonry tower with red bands, on Nanwell Point, a wooded bluff.

A hill, 134m high, lies about 0.8 mile N of Vihur Point. Murud Hill, 306m high, is conspicuous about 2.5 miles E of the same point.

Janjira Fort, 37m high and conspicuous, stands on a rocky islet, about 2 miles NE of Nanwell Point and abreast the village of Rajpuri. A light is shown from the fort.

Bandar Hill, a small round headland 70m high, with a grassy summit, lies about 1 mile NNW of Janjira Fort. A light is shown periodically from the hill.

Kansa Fort, its walls about 6.1m high and partly in ruins, stands on a reef about 2.5 miles N of Nanwell Point.

The Nawabs Palace and flagstaff are conspicuous on a steep bluff, 33m high, about 1.3 miles NE of Kansa Fort.

The town of Murud, surrounded by a large grove of palm trees, is situated on the N side of the entrance between Bandar Hill and Nawabs Palace.

**Anchorage.**—Anchorage can be obtained, in about 5m, with Janjira Fort bearing 001°, about 0.7 mile. Anchorage with better shelter can be obtained in about 5.5m with the fort bearing 330°, distant about 1.75 miles, and with Sandy Point bearing 100°. Sandy Point lies about 3.5 mile E of Nanwell Point.

**Directions.**—A vessel bound for Murud-Janjira Harbor should keep in depths greater than 11m until Janjira Fort is identified. Then bring Fort Janjira to bear 090° and steer for it on that bearing until Nanwell Point Light bears 180°. Course is then altered SE into the harbor, or steer for Sandy Point bearing 116° to the anchorage, in a least depth of 4.4m.

Approach to the anchorage may be obstructed by lines of fishing nets and, from November to April, by fishing stakes.

## Muhud-Janjira Harbor to Port Bankot

**2.31 Kumbaru Point** (18°13'N., 72°56'E.), 70m high, lies about 3.5 miles S of Nanwell Point and is the N entrance point of Kumbaru Bay. The point fronts densely wooded hills rising to about 240m; there is a conspicuous bluff about 2.3 miles E of the point.

Shah Jehan Shoal, with a least depth of 4.2m, lies about 1 mile SW of Kumbaru Point. Depths are irregular for a short distance W of this shoal and vessels in the vicinity should keep in depths greater than 11m.

Anchorage, sheltered from NW winds, can be taken, in a depth of 4.5m, SE of Kumbaru Point.

Srivardhan Bay, about 5 miles SSE of Kumbaru Bay, is shallow and the village of Srivardhan lies at its head. A light is shown from the S end of the N entrance point of the bay from September to May.

Anchorage off Srivardhan for large vessels can be obtained, in 10m, mud, about 3 miles WNW of **Srivardhan Point** (18°01'N., 73°00'E.), the S entrance point of the bay.

## Port Bankot (17°59'N., 73°03'E.)

[World Port Index No. 48870](#)

**2.32** Port Bankot lies from 1 to 2 miles within the bar at the entrance of the Savitri River, which is entered between Devgarh Point, 55m high, and Rankuran Point, about 1.5 miles SSE. Bankot, a fishing village, extends some distance along the

S bank of the river. The Savitri River becomes a narrow stream above the village.

**Tides—Currents.**—The tidal currents set over the bar NNE with the flood, and SSW with the ebb, attaining a velocity of 0.8 knot at springs.

Between the bar and the anchorage off Bankot the flood current sets slightly toward the sandbank on the N side of the channel, while the ebb follows the direction of the channel.

At the anchorage off Bankot the velocity of the tidal currents at springs is about 2.5 knots.

**Aspect.**—The entrance of the Savitri River may be identified by Hareshwar Hill, 109m high, dark, and conical, about 0.3 mile E of Devgarh Point. Hareshwar Donghur, 125m high, is conspicuous about 0.8 mile farther NE.

The high black walls of Fort Victoria, in ruins, stand at an elevation of 140m, about 0.8 mile ENE of Rankuran Point. A high pillar and large pyramidal headstone, both prominent from outside the bar, stand in a cemetery close under the walls of the fort. The hill from Fort Victoria slopes down to Panbruj Point, about 0.8 mile NE of Rankuran Point.

The entrance to the channel over the bar was 1 mile W of Rankuran Point, with a least depth of 2.1m in 1968. The N side of the entrance is marked by a red can buoy, and the S side by a black conical buoy. A drying sandbank N of the channel, over which the sea breaks heavily, is marked by a red can buoy. The existence of these buoys is doubtful.

Depths gradually increase within the bar, and off Panbruj Point there is a pool with depths of 13m.

**Pilotage.**—The services of a local unlicensed pilot can be obtained on application to the Customs and Port Officer.

**Anchorage.**—Outside the bar, anchorage can be taken in a depth of 9m.

Off Port Bankot vessels may anchor, in about 10m, off the custom house, which lies about 0.3 mile ENE of Panbruj Point.

**Directions.**—The NW corner of Fort Victoria bearing 079° leads across the bar. The channel then leads 055° and passes close W of Panbruj Point.

The channel over the bar is liable to change and passage into the river should not be attempted without local knowledge.

**Caution.**—Caution is required in crossing the bar; during strong W breezes heavy breakers are raised over the bar and there is always a cross sea.

## Port Bankot to Port Dabhol

**2.33** The coast between the entrances of the Savitri River and the Vashishti River, about 25 miles SSE, consists of a series of plateaus at elevations of 150 to 210m.

Kanta, a peak 346m high, about 2.3 miles ESE of Bankot, and Gimona Peak, 306m high, about 10 miles farther SSE, are two conspicuous peaks along this coast.

The seaward slopes of the plateaus are generally abrupt, but in places there is a narrow strip of land between the plateaus and the beach. The vegetation consists of sparse bushes with very few trees.

A vessel proceeding between the two rivers will not encounter any shoals by keeping from 1.5 to 3 miles offshore and in depths of over 9.1m. Care must be taken to avoid the logs marking the fisheries, which may be met about 5 miles W of the entrance to the **Jog River** (17°50'N., 73°05'E.).

An islet, about 2 miles S of the entrance to the Jog River, lies close S of a promontory projecting from the coast at Harnai. Harnai Light is shown from a white masonry tower on the promontory.

Janjira Fort, a fortified islet, 19m high and covered with vegetation, stands about 0.5 mile NW of the above-mentioned islet. Janjira Fort, standing under a range of hills, is not easily distinguished from seaward.

Burondi Bay lies about 6 miles SSE of Janjira Fort. The bay affords anchorage, with some shelter from S winds, in a depth of 3.7m.

**2.34 Port Dabhol** (17°35'N., 73°10'E.) lies in the estuary of the Vashisti River, which is navigable at all times by vessels with a draft of 3m as far as Karbone, about 16 miles within the entrance, and thence, at HW only, to Chiplum, 10 miles farther up.

**Tolkeshwar Point** (17°34'N., 73°09'E.), the S entrance point of the river, is bold and faced with cliffs about 90m high; an ancient Hindu temple and a prominent clump of trees stand on its summit. Ranvi Point, about 0.5 mile S of Tolkeshwar Point, has a very large boulder and overhanging cliff N of it.

Sili Point, the N entrance point of the river, lies nearly 2 miles ENE of Tolkeshwar Point. Chirpulti Sand, which dries, extends about 1.5 miles WSW of the point.

**Tides—Currents.**—The tidal rise at Port Dabhol is 2.7m at MHHW and 2.2m at MLHW.

The tidal current sets NE over the bar with the flood and SW with the ebb, attaining a velocity of about 1.5 knots.

Inside the bar the flood current sets into Anjanvel Bay and the ebb onto Churpulti Sand.

The flood current continues for about 1 hour after HW and the ebb current for about 1 hour after LW. At neaps, the ebb current occasionally commences 1 hour before HW.

**Depths—Limitations.**—The bar, with a least depth of 2.7m on the entrance range, extends about 0.7 mile NW of Tolkeshwar Point. Within the bar, the depths increase from 7.6m to 12.8m.

Churpulti Sand lies on the N side of the channel.

**Aspect.**—The land on both sides of this river is hilly and undulating; the hills, about 90 to 120m high, slope steeply to the coast and terminate in cliffs from 5 to 25m high.

Pir Balu, a conical hill 248m high, with a dome-shaped tomb on its summit, is located about 4.3 miles ENE of Tolkeshwar Point and is a good landmark as it lies out above the flat rocky ridges in the vicinity.

Tolkeshwar Point Light is shown from a white, square, masonry tower on Tolkeshwar Point. This light may be occasionally obscured by clouds because of its elevation of 104m. The point has been reported to be a good radar target at 23 miles.

Anjanvel Fort, in ruins, is situated about 0.8 mile ENE of Tolkeshwar Point. Anjanvel Bay, E of the fort, is shallow. Veldur Hill, 81m high, is located on the E side of Anjanvel Bay.

Range lights, on the S side of the river, in line bearing 081°, lead across the bar. The front light is situated close N of Anjanvel Fort and the rear light stands on the N slope of Veldur Hill, about 0.8 mile E.

A red can buoy marks the W end of the bar; another red can buoy is moored off the S side of Churpulti Sand. A red can lighted buoy is moored about 0.5 mile SW of Sil Point.

**Pilotage.**—The services of a local unlicensed pilot can be obtained on application to the Customs and Port Officer.

**Anchorage.**—Good anchorage may be obtained outside the bar, in calm weather, in 10m, clay, about 1.3 miles WNW of Tol-keshwar Point.

Anchorage may also be obtained in midstream, S of the pier at Dabhol, in a depth of about 8.5m, mud.

**Directions.**—Vessels intending to enter the Vashishti River should not proceed into depths less than 9.1m until Tol-keshwar Point Light bears 095°. When the light structure is on this bearing, distant 1.5 miles, bring the range lights in line bearing 081°. When Tol-keshwar Point Light bears 180°, steer to pass about 137m N of Anjanvel Fort Light, the front range light. When the latter light bears 180°, steer a mid-channel course, keeping about 0.1 mile offshore to avoid the coastal reef which extends about 91m offshore near Veldur Hill.

Care must be taken to avoid fishing logs which are often moored both inside and outside the river.

**Caution.**—A dangerous wreck, best seen on the chart, is situated 6 miles WSW of Tol-keshwar Point, the position of which is approximate. Another dangerous wreck lies 5 miles SW of the same point, along the 20m line.

## Port Dabhol to Jaigarh Bay

**2.35** A sandy beach extends about 3.8 miles SSE from a position about 3 miles SE of Tol-keshwar Point. Guhagar, a large village, lies parallel to the beach close inland.

Cliffs, about 100m high inland near their N end, extend from the sandy beach to Palshet Bay, about 1 mile S. Palshet Light is shown from the N entrance point of the bay; the light is obscured by high land when bearing more than 141°.

**Boria Headland** (17°24'N., 73°10'E.), about 2 miles SW of Palshet Bay, attains an elevation of 118m. Boria Pagoda, a small conspicuous temple, stands at the NW end of the headland within a summit of the point. Boria Pagoda has been reported to be a good radar target at 18 miles.

Boria Bay lies SE of Boria Headland. Anchorage, sheltered from NW winds, may be obtained by small vessels in depths of 8m, mud.

The coast between Boria Headland and Bhandarawadi Point, 3.5 miles SSE, is composed of small, sandy bays divided by rocky points.

**2.36 Jaigarh Bay** (17°18'N., 73°13'E.) is entered between Jaigarh Head and Bhandarawadi Point, about 1.8 miles NE. The estuary of the Shastri River, which flows into the head of the bay, forms a sheltered, convenient harbor, fairly easy to access, even during the Southwest Monsoon, for vessels of about 3.4m draft with local knowledge.

**Depths—Limitations.**—The bar of the Shastri River extends NNE from close W of Jaigarh Fort to close E of Katane Reef, which dries 0.6m about 0.2 mile SW of Bhandarawadi Point.

A channel leads E across the S end of the bar about 0.2 mile offshore and had a least depth of 3.7m in 1964, but it is subject to change.

Mora Sands, which dry 1.2m, extend about 0.6 mile W of the NE entrance point of the Shastri River, leaving a navigable channel about 183m wide between Mora Sands and Jaigarh.

**Aspect.**—**Jaigarh Head** (17°18'N., 73°11'E.) has Karateshwar Point at its NW extremity; this point appears from seaward to be a level and almost barren plateau terminating in steep rocky cliffs. A Hindu temple stands on the steep face of the cliffs. Jaigarh Head has been reported to be a good radar target at 20 miles.

Jaigarh Head Light is shown from a tall, black iron tower with white bands, on the SW end of Jaigarh Head. Dhamankhol Light is shown from a white tower about 0.5 mile NE of Jaigarh Head Light.

Jaigarh Fort, an old fortress containing a few houses, is situated on a rocky point, about 2 miles E of Jaigarh Head Light; a light is shown from the NW corner of the fort. The town of Jaigarh extends along the coast for about 0.8 mile S of the fort.

Trize Kila, a ruined fort, is situated about 1 mile E of Jaigarh Fort. The NE side of Jaigarh Bay consists of ridges of bare hills, about 61 to 91.4m high, with steep cliffy sides and small sandy indentations.

**Anchorage.**—Anchorage can be taken in Dhamankhol Bay, in about 8m, about 0.4 mile E of Dhamankhol light structure.

There is good sheltered anchorage E of Jaigarh, but the best anchorage is in 8.5m, about 0.8 mile SE of Jaigarh Fort.

**Caution.**—Vessels approaching Jaigarh Bay from the S should not close Karhateshwar Point within 0.3 mile to avoid foul ground.

A dangerous wreck lies 23 miles W of Jaigarh Head.

## Jaigarh Bay to Ratnagiri Bay

**2.37 Ambwah Bay** (17°16'N., 73°13'E.) lies E of Ambwah Point, the S extremity of Jaigarh Head. Anchorage, sheltered from NW winds, is available in 7.3m, mud and sand, ESE of Ambwah Point.

A 10m patch and an 8.8m patch lie about 0.5 mile SW and 0.8 mile SSE, respectively, of Ambwah Point.

Warori Bluff, about 4.5 miles SSE of Ambwah Point, is a conspicuous promontory, 70m high. A light is shown about 0.5 mile SE of the W extremity of Warori Bluff. Good radar returns have been reported from Warori Bluff at 17 miles.

**Anchorage.**—Small vessels can obtain sheltered anchorage during the Southwest Monsoon on the N side of Warori Bluff, in a depth of 5.5m.

Neori Point, about 5.5 miles SSE of Warori Bluff, is 64m high. The point has been reported to be a good radar target at 15 miles.

**Vada Mirya** (Mirya Donghur) (17°02'N., 73°16'E.), a high rocky headland, is lighter in color than the adjacent coast, and resembles an island when seen from the N or S. The W end of the headland terminates in steep cliffs. Mirya Peak, 142m high, the conspicuous summit of this headland, lies about 0.5 mile NNE of Miyet Point, the SW extremity of the headland. Tonkul Peak, 115m high, lies nearly 1 mile N of Mirya Peak.

Good radar returns have been reported from Vada Mirya at 16 miles.

Sookana Shoals, with a least depth of 9.4m, lie about 1 mile NNW of Sookana Point, the NW extremity of Vada Mirya.

Kalbadevi Bay is entered between Sookana Point and Kurne Point, about 2.5 miles NE.

Anchorage may be obtained, in 8m, about 0.7 mile E of Sookana Point and 0.3 mile offshore. Local vessels call here during the Southwest Monsoon.

Mirya Bay is entered between Miyet Point and **Galee Point** (17°00'N., 73°16'E.), the N extremity of The Fort, about 1.5 miles SSE. The shore at the head of this bay is covered with coconut palms and is fronted by a ridge of sandhills. A conspicuous temple stands on Galee Point.

Mudle Shoal (Taylor Shoal), with a least depth of 1.1m, and marked on its S side by a buoy, lies about 0.7 mile SE of Miyet Point. The sea breaks over this shoal at LW.

Bhagwati Bunder (Mirya Bay), a new port, has a breakwater 0.3 mile long extending N from Galee Point; it provides sheltered anchorage throughout the year in depths up to 9.1m, sand and mud. However, attention should be given to Taylor Shoal, which lies N of the entrance to the breakwater; a shoal, with a least depth of 3.4m, lies 0.4 mile ENE of N end of breakwater.

## Ratnagiri Bay (16°59'N., 73°17'E.)

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**2.38** Ratnagiri Bay, entered between The Fort and **Kushipur Point** (16°57'N., 73°17'E.), about 2 miles S, affords no shelter during the Southwest Monsoon, when smooth-water anchorage can be found in Kalbadevi Bay.

The Fort, on the N side of the entrance, is an old structure which covers a bold, conspicuous, and rocky headland up to 91m high. It appears as an island from a distance, and is connected to the mainland by a sandy neck.

The Ratnagiri River, entered about 1.3 miles E of The Fort, is only navigable by small craft at HW. The town of Ratnagiri is situated on the N side of the river entrance, on the brow of a flat ridge, about 46m high. There is a Coast Radio Station at Ratnagiri.

**Depths—Limitations.**—In the N part of the bay, the depth in the entrance is about 11m, decreasing gradually E, but abruptly to the reef which extends from the N shore; the bottom is sand and mud.

About 0.7 mile ENE of the N entrance point, a reef, on which the sea breaks heavily in bad weather, extends about 0.4 mile SSW. Close S of the S edge of this reef is a depth of 8.7m.

Depths of less than 7m extend nearly 1 mile NW of Kushipur Point. Brum Mudle Rock, 3.5m high, which breaks heavily during the Southwest Monsoon, lies about 0.3 mile NNW of the same point.

**Aspect.**—Ratnagiri Light is shown from a tall black and white checkered, round, concrete tower on the S bastion of The Fort. A radiobeacon and a racon are situated at the light.

A palace, 83m high, is conspicuous about 2.3 miles E of Ratnagiri Light.

**Signals.**—Storm signals are shown at Ratnagiri Light; the **Brief System** is used.

**Anchorage.**—At the beginning and end of the Southwest Monsoon vessels should anchor, in 11m, with Ratnagiri Light bearing 000°, distant about 0.7 mile.

Vessels can anchor, in 9.6m, with the same light structure bearing 315°, distant about 0.5 mile. Shallow draft vessels can anchor farther N.

## Ratnagiri Bay to Vijayadurg Harbor

**2.39** Between Ratnagiri and the Machkandi River (Muchkundi River), about 11 miles S, the land rises gradually from the coast in undulating hills reaching a height of 200m about 5 to 6 miles inland. **Chandralli** (Dhulia) (16°56'N., 73°26'E.), a round wooded hill 280m high, about 9.5 miles ESE of The Fort, is the only conspicuous feature.

Pavas Bay (Paos Bay) is entered S of **Pavas Point** (16°54'N., 73°17'E.). Golap Hill, 120m high, lies about 1 mile NE of Pavas Point.

Vessels can anchor in Pavas Bay, in a depth of about 8.5m, mud and sand, sheltered from NW winds.

The coast between Pavas Bay and Purangad Bay, about 5 miles S, consists of rocky tableland and sandy bays, and is free from dangers.

**Purangad Bay Light** (16°49'N., 73°18'E.) is shown, except during the strength of the Southwest Monsoon, from the N entrance point of Purangad Bay. About 1 mile farther E, a ruined fort stands on a bare hill on the N side of the entrance to the Machkandi River. Khavri, a mountain 346m high, lies about 10 miles E of the river entrance.

The coast between Purangad Bay and Wada Vetye (Yetia), a village about 6 miles S, consists of a rocky tableland; thence to Ambolgarh Point, about 3 miles farther S, it is sandy and backed by a range of hills 84 to 97m high. A conspicuous hill, 103m high, lies about 0.5 mile NW of Wada Vetye.

Ambolgarh Bay lies between Ambolgarh Point and Musakazi Point (Musargagi Point), about 1 mile SSE. There is a sandy beach at its head, and the ruins of a large salt works stand in a valley on the S side.

Ambolgarh Reef, with a small drying patch at its center, lies about 0.4 mile SW of Ambolgarh Point; the sea breaks heavily over this reef. A black conical buoy is moored near the SW extremity of the reef.

**2.40** **Rajapur Bay** (16°37'N., 73°20'E.) is entered between Musakazi Point and Wagapur Point, about 1 mile SW; each point is about 21m high. A light is shown from September to May from Musakazi Point. A light is shown from a tall, white, square, concrete tower with black bands on Wagapur Point; foul ground extends about 0.1 mile WNW of the point.

The coast between Wagapur Point and Vijayadurg Harbor, about 2 miles S, consists of cliffs about 21m high. Holli Hill, 85m high, about 2.3 miles E of Wagapur Point, is a round, sloping, conspicuous hill on the E side of Rajapur Bay. It presents the same appearance from all directions, and lies out from the tableland in this vicinity which is faced with steep cliffs.

The Rajapur River flows into the head of Rajapur Bay at its NE end. The bar of the river has depths of 1.8 to 2.3m; abreast the village of Jaitapur, which lies on the S bank of the river about 1 mile within its entrance, there are depths of 4.6 to 7.3m.

**Anchorage.**—Rajapur Bay affords anchorage, in a depth of 8m, protected from NW winds which may blow strongly, but

the anchorage is not safe during W winds, which raise a heavy short swell in the bay.

**2.41 Vijayadurg Harbor** (Viziadurg Harbor) (16°34'N., 73°20'E.) is entered between **Burmana Point** (16°33'N., 73°19'E.), 24m high, and a point about 1.5 miles NNE. Burmana Reef, over which the sea breaks, extends about 0.2 mile WNW and 0.2 mile NNW of Burmana Point. An 8.2m shoal lies about 0.2 mile NW of the same point.

A conspicuous fort stands on a projecting rocky point, about 26m high and 0.8 mile ENE of Burmana Point. This point forms the W side of the entrance to the Vaghotan River. The fort is obscured from the S by the higher land in that direction.

Vijayadurg Light is shown from a white steel tower with red horizontal bands on the NE corner of the fort. Vijayadurg, a small village, is situated about 0.8 mile S of the light structure.

**Depths—Limitations.**—Depths in the harbor decrease regularly from about 12m in the entrance to the E shore of the bay. Depths in the fairway between the point on which the fort lies and a cliff, 19m high, about 0.7 mile ENE, are about 6.5m, but decrease sharply farther within the river to 3.7m.

**Anchorage.**—Anchorage can be taken anywhere in the harbor, according to draft, during good weather. A convenient position is about 0.5 mile NNE of Vijayadurg Light, in 8m, mud.

## Vijayadurg Harbor to Malvan Bay

**2.42** The coast between Vijayadurg Harbor and Devgarh Harbor, about 10 miles S, is fairly regular, although entered by numerous streams and creeks. Steep, abrupt cliffs are fronted by sandy beaches and coves. The land behind the cliffs is flat, but farther inland it rises to bare rocky hills with no vegetation except in the rainy season.

**Devgarh Harbor** (16°23'N., 73°22'E.) is entered N of Fort Point, which lies at the N end of a rocky peninsula, 37m high. The peninsula appears like an island, but its S end is connected to the mainland by a narrow sandy neck. The town of Devgarh lies NE of the sandy neck. Depths in the harbor restrict its use to vessels of comparatively shallow draft.

An old fort, from which a light is shown, stands on Fort Point. Two towers, 41 and 36m high, stand about 0.4 mile and 0.7 mile, respectively, S of Fort Point; another tower stands about midway between the two towers. The town of Devgarh has a post office and a hospital.

Storm signals are shown at the light tower using the [Brief System](#).

Round Hill, 108m high, and Saddle Hill, 140m high, lie about 2.5 miles NNE and E respectively, of Fort Point.

**Tides—Currents.**—Outside the harbor the tidal currents are irregular, both in strength and direction, being much influenced by the wind; on several occasions they were observed to set NW on the flood and SSW with the ebb, with a velocity of up to 1.5 knots.

At the entrance to the harbor the currents attain a velocity of 1 to 1.5 knots with the spring ebb.

**Anchorage.**—The recommended anchorage is with Devgarh Harbor Light bearing 203°, distance 0.3 mile, and the N en-

trance point of the harbor bearing 306°, in a depth of 6m. Farther in depths shoal gradually; small vessels can find more sheltered anchorage SE of Fort Point, in depths of 3 to 4m.

**Directions.**—Vessels proceeding into Devgarh Harbor should approach with Saddle Hill in line with the N side of the fort on Fort Point, bearing 090°; when 1 mile from Fort Point, and when Mumbri Point bears 153°, steer 080° to pass 0.2 mile N of Fort Point. Foul ground and depths of less than 5m extend 0.3 mile SW from the N entrance point of the harbor, and 160m N from Fort Point, the fairway between being about 0.3 mile wide.

**2.43** The coast between Devgarh Harbor and Achra Point, about 12 miles SSE, is similar to the coast N of Devgarh Harbor to Vijayadurg Harbor.

Devgarh Hill, 95m high, lies close to the coast, about 5 miles SSE of Fort Point. Devgarh Hill has been reported to give a good radar response at 14 miles.

**Achra Point** (16°12'N., 73°26'E.), 41m high, is the N entrance point of the Achra River, which is only accessible to boats. A light is shown during good weather from the point.

The coast from the mouth of the Achra River to the entrance of Kalavali Creek, about 7 miles SSE, is sandy and fringed with coconut palms. A range of hills of moderate height, with no conspicuous peaks, about 4 miles inland, extends roughly parallel with the coast.

Kura Patches, with a least depth of 9.6m, lies about 2 miles SSW of Achra Point.

**Kura Islet** (16°06'N., 73°27'E.), 9m high and the largest of three rocks, lies in the center of a group of rocks, about 1.3 miles NW of the entrance of Kalavali Creek. A 10.5m patch lies about 2 miles NNW of Kura Islet and about 1.5 miles offshore. A 5m patch lies about 0.7 mile S of Kura Islet.

**2.44 Malvan Bay** (16°06'N., 73°28'E.) is entered between Fort Rajkot and Sindhudrug Janjira, about 0.5 mile S. The entrance is much encumbered by rocky shoals, and the bay is accessible to shallow draft vessels but only during good weather. A conspicuous radio tower, with an elevation of 220m, stands 5.5 miles ENE of Malvan Bay.

Sindhudrug Janjira is a low, fortified island on the coastal reef, which is connected to the mainland E by a drying reef. A light is shown from the W end of the island during good weather.

Fort Rajkot, on the N side of the entrance, has foul ground extending S and SE of it. A flagstaff, 21m high, is situated at the SW end of the fort. The town of Malvan is situated on the N side of the bay almost hidden by coconut palms.

Johnston Castle Rock, consisting of two rocky heads with depths of less than 1.8m, lies about 0.4 mile W of the N end of Sindhudrug Janjira.

Rajkot Rock, with a depth of 3.7m, lies about 0.3 mile SSW of Fort Rajkot.

Range lights, in line bearing 075.5°, at the head of the bay, lead through the buoyed fairway into Malvan Bay. The range lights and buoys are only in operation during good weather.

**Anchorage.**—Vessels can anchor off the entrance to Malvan Bay, in 15m, mud, with the N end of Sindhudrug Janjira bearing 095°, about 0.9 mile.

Shallow draft vessels can anchor in the bay in depths of 4m, on the range line, and with a small fort, situated about 0.2 mile NE of Sindhudrug Janjira, bearing 163°.

## Malvan Bay to Vengurla Roads

**2.45** The coast is sandy between Malvan Bay and a point about 7 miles SSE, on which is situated the ruins of Niuti Fort. Then to Vengurla Point, about 8 miles farther SE, the coast forms a bight with several rocky capes and sandy bays.

A prominent hill, 159m high, lies about 2 miles N of Niuti Fort. Bhubra Rock, awash, lies about 0.3 mile SW of the fort; the rock is marked SW by a buoy, which is unreliable, and in position only during good weather.

**Malvan Rock** (16°02'N., 73°26'E.), with a swept depth of 2.5m, lies about 1.5 miles WSW of Sindhudrug Janjira.

**Caution.**—When passing Malvan Rock at night Vengurla Rocks Light (15°53'N., 73°28'E.) should not be brought to bear more than 158°, nor should a vessel approaching this rock proceed into depths of less than 27m.

Mandel Rock, 7m high, about 1 mile S of Sindhudrug Janjira, lies at the W edge of a group of shoals, some of which are awash. There are detached shoal patches, with depths of less than 5.5m, about 0.7 mile SSE and SW and nearly 0.9 mile WSW of Mandel Rock.

**2.46 Square Rock** (15°59'N., 73°27'E.), 11m high, lies about 4.3 miles NW of Niuti Fort, and provides a useful mark to avoid the dangers N and S of it, and the foul ground extending E of it to the coast. A 6.4m patch lies about 0.8 mile SSW of the rock.

Chaldea Rock, awash, lies about 2.5 miles WNW of Niuti Fort; it lies at the S end of foul ground between it and the shore NE. A buoy is moored about 0.5 mile WSW of the rock during good weather.

Vengurla Rocks (Burnt Island) is a group of islets and rocks in dangerous foul ground extending about 3 miles S of **Karil Rock** (15°56'N., 73°28'E.), which is 14m high and the N of the group.

Some above-water rocks, steep-to on their N side, extend about 137m NW of Karil Rock. A rock, awash, lies about 0.3 mile E of Karil Rock.

Vengurla Rock, 44m high and conical, lies about 2.3 miles S of Karil Rock and is the highest of the group.

**Vengurla Rocks Light** (15°53'N., 73°28'E.) is shown from the NW point of an islet about 0.3 mile SSW of Vengurla Rock.

Tapti Rock, the S danger of the group, lies about 0.8 mile SSW of Vengurla Rock, and consists of two rocky heads with less than 1.8m; it is steep-to on its S side.

An islet, with a disused lighthouse near its SE extremity, lies about 0.3 mile NNW of Tapti Rock.

Vengurla Rocks have been reported to give good radar returns at 18 miles.

**Anchorage.**—Anchorage, with good protection from NW winds can be obtained, in a depth of 21m, mud, 1 mile ESE of the S end of Vengurla Rock.

**Caution.**—Between Malvan Rock and the S extremity of Vengurla Rocks, except in the N end of Karil Kachal Channel, the bottom is sand and rock and there are sudden overfalls. No

vessels should proceed into depths of less than 18.3m in this vicinity.

Karil Kachal Channel leads from seaward between Chaldea Rock and Karil Rock, about 1.3 miles SSW. A depth of 7.2m lies about 0.3 mile ENE of Karil Rock. A similar depth lies about 0.3 mile S of Chaldea Rock.

Vessels coming from the N should approach this channel with **Wagh-Giri** (15°53'N., 73°42'E.) bearing 105° and well open S of the point on which Niuti Fort stands. When the fort bears 093°, steer through the fairway on that bearing which leads N of Karil Rock, in charted depths of about 9.6m.

When Vengurla Rock bears more than 186°, a vessel will be E of the rock awash lying E of Karil Rock. Course may then be gradually altered SE to pass SW of Bhubra Rock, and then to Vengurla Roads.

Vessels should not use this channel at night, but should pass W of Vengurla Rocks in depths of 31 to 37m.

**2.47 Vengurla Roads** (15°51'N., 73°37'E.) lies S and SW of Vengurla Point, 79m high. Vengurla Point Light is shown from a hexagonal masonry tower on the point; a flagstaff stands on the point.

Wagh-Giri, a conspicuous wooded mountain, 322m high, lies about 5 miles ENE of Vengurla Point.

**Tides—Currents.**—Currents between Vengurla Point and the N entrance to Karil Kachal Channel set N on the flood current and S on the ebb, with a velocity of about 1 knot in spring tides.

**Anchorage.**—Large vessels can anchor, in 10m, with the flagstaff on Vengurla Point bearing 036°, distant 1 mile, or closer inshore, in similar depths on the same bearing with the flagstaff distant about 0.4 mile.

Small vessels with local knowledge can anchor, in about 4m, in the bight on the E side of Vengurla Point.

**Caution.**—South West Point Rock, with a least depth of 1.2m, and marked SW by a buoy, lies about 0.3 mile W of Vengurla Point.

South Rock, with a depth of 3.2m, lies about 0.4 mile S of Vengurla Point; shoal patches lie W and SW of it. A buoy, moored about 229m NW of South Rock, marks these dangers.

East Rock, with a depth of 1.8m, and marked W by a buoy, lies about 0.3 mile SE of Vengurla Point.

## Vengurla Roads to Marmugao Bay

**2.48** Machlimar Point, 85m high, lies about 3.5 miles SSE of Vengurla Point. The entrance of the Talavda River lies about 1 mile SSE of the point.

**Port Redi** (15°45'N., 73°39'E.) is an open roadstead off Redi Point. Vessels load ore at the anchorage from lighters working to jetties near the ore mines. The port is protected from N winds and currents by cliffs which almost encircle it. It is closed during the Southwest Monsoon from mid-September to mid-May.

Redi Point is a flat rocky projection, 15m high at its W end. Redi Rock (Rairi Rock), 11m high, lies about 1 mile S of the point, at the S end of foul ground extending W and SSW of the point. Redi Fort (Rairi Fort), with an elevation of 34m, stands about 1 mile NE of Redi Point.

**Pilotage.**—Pilotage at Port Redi is compulsory. The vessel's ETA should reach the Port Office Redi (Ratnagiri) 24 hours prior to arrival. The pilot boards 1 to 1.5 miles W of Redi Point; vessels should anchor here to wait for the pilot. Port authority is exercised by the Port Officer, who also acts as pilot.

**Signals.**—Storm signals are shown at Port Redi; the [Brief System](#) is used. See Pub. 160, Sailing Directions (Planning Guide) South Atlantic Ocean and Indian Ocean for further information.

**Anchorage.**—Anchorage can be obtained, in about 13m, off Redi Rock by vessels loading ore.

The Terekhol River (Tirakul River), about 2.5 miles SE of Redi Point, is fronted by a bar with depths of about 2.5m, but subject to change. Terekhol Fort lies on the brow of a hill on the N side of the river entrance.

Havelock Rock, a sharp pinnacle awash, lies about 2 miles W of the river entrance. Another rock, awash, lies nearly 0.5 mile farther ENE.

**Anchorage.**—Anchorage can be obtained in 9.1m, mud, about 0.8 mile SE of Havelock Rock.

**Chapora Fort** (15°36'N., 73°44'E.), about 7 miles SSE of the Terekhol River, is easily identified by its black walls, and stands on a high bluff on the S side of the entrance of the Chapora River.

A conspicuous church is situated on Baga Point, about 2.5 miles farther S.

**2.49 Aguada Bay** (15°29'N., 73°47'E.), entered between Aguada and Kabo Rajniwas, about 1.8 miles SSE, affords anchorage to moderate-sized vessels during the Northeast Monsoon. The bay is free from dangers, but strong W winds produce a heavy swell.

**Panaji** (15°30'N., 73°50'E.), the capital and seat of government of the State of Goa, Daman, and Diu is situated on the S bank of the Mandavi River, which enters the head of the bay. The city is well built, with prominent buildings along the waterfront. A bridge spans the river at the E end of the city.

**Tides—Currents.**—The tidal rise at Panaji is 2m at MHHW and 1.9m at MLHW.

The ebb current sets strongly out of the Mandavi River, but is weak at the anchorage off Aguada, where the flood current is barely perceptible.

**Depths—Limitations.**—Depths in the entrance of Aguada Bay are about 7.6m, decreasing gradually to the head of the bay.

Outer Patches, with a least depth of 0.9m, lies about 0.8 mile W of Kabo Rajniwas.

The bar of the Mandavi River, which is subject to frequent change, has a depth of 2.1m during good weather. During the Southwest Monsoon, heavy breakers extend across the entrance and render it impassable.

The main channel, less than 183m wide, lies between sand banks extending about 0.8 mile SW of Raji Magus, the N entrance point of the river, and about 0.3 mile W from Gaspar Dias, the S entrance point of the river. Raji Magus Light is shown from mid-August to mid-June from a white, round tower 0.3 mile NNE of Raji Magus Point.

In 1987, a shoal depth of 2m existed about 0.5 mile SW of Gaspar Dias.

Raji Sand, which dries, lies in the fairway W of Panaji.

The dangers in the channel are not marked.

**Aspect.**—Aguada is a bold, bluff headland, 80m high, which appears from seaward to have a flat summit. The headland is fortified on its N side, and a fort with a flagstaff lies on its S side, with a disused white round tower.

Aguada Light is shown from a white rectangular tower close N of the fort, and a tower lies close SE in the N part of the fort. A racon is situated at the light. Another light is shown about 183m S of the tower.

A chapel, with an elevation of 74m, stands about 0.5 mile E of Aguada Fort Light.

The coast close N of Aguada is low and a heavy surf always runs along the foreshore.

Kandoli Hill (Candolim Hill), about 2 miles N of Aguada, is easily recognized by three conspicuous banyan trees, with an elevation of 101m, which lie on it.

Kabo Rajniwas, at the W extremity of the island of Goa, is a prominent headland, 55m high. A conspicuous church spire is situated near the seaward end of the headland.

A group of radio masts, with an elevation of 86m, stand near the summit of Panaji Hill, S of Panaji. A conspicuous water tower, with an elevation of 82m, is situated about 0.5 mile farther SE.

Lights in line, bearing 054°, lead close W of Outer Patches and across the bar at the entrance to the Mandavi River, to the 191° Tejo leading line. Leading lights are shown at Tejo, bearing astern 191°, which lead through the channel W of Raji Sand. These lights are extinguished during the Southwest Monsoon when the bar is closed to navigation. A dangerous wreck lies in a position close NE of Outer Patches, about 183m S of the lead.

**Pilotage.**—Pilotage is not compulsory in the Mandavi River, but it is advisable to employ a local guide who may be engaged by telegram or fax to the Captain of the Port, Panaji.

**Anchorage.**—During good weather large vessels can anchor, in about 14m, mud, about 2 miles W of Aguada.

Vessels of moderate size can anchor, in 6.4m, mud, with Aguada Fort Light bearing 333°, distant 1 mile.

**Caution.**—Vessels approaching from the N should give the W extremity of Aguada a berth of at least 1 mile. A dangerous wreck lies in about 4.5 miles NW of Mormugao Head.

Vessels approaching from the S should take care to avoid the dangers in the entrance to Marmugao Bay and the foul ground extending W from Kabo Rajniwas.

## Marmugao Bay (15°26'N., 73°48'E.)

[World Port Index No. 48970](#)

**2.50 Marmugao Bay** (Mormugao Bay) is entered between Marmugao Head and Kabo Rajniwas, previously described with Aguada Bay in paragraph 2.49, about 3 miles N. The entrance to the bay is encumbered with shoals. The Grandi Islands lie in the S approach to the bay.

The port of Marmugao, protected by a breakwater, lies on the N side by Marmugao Head. It is an important port for the exportation of iron and manganese ore.

**Port Authority of Marmugao**

<http://www.mptgoa.com>

### Winds—Weather

Occasional strong NE winds from about the middle of February to the end of March cause a heavy swell in Marmugao Bay. These winds usually last from 3 days to a week and decrease in strength from sunset to sunrise. However, it has been cautioned by the local authorities that the weather deteriorates without warning.

### Tides—Currents

The tidal rise at Marmugao is 2.1m at MHHW and 1.8m at MLHW.

Tidal currents in the outer anchorage off Marmugao Bay are weak.

### Depths—Limitations

**Port facilities.**—The port is approached by a dredged channel entered between Lighted Buoy No. 1 and Lighted Buoy No. 2, moored 2 miles W of of Marmugao Point. The channel, which leads to the inner anchorage and the berthing area, is 250m wide. The channel was maintained to a depth of 13.7m along its centerline over a width of 150m, although lesser depths have been reported (1998). The remaining outer 50m of the channel width on each side may have depths of up to 3m less than charted.

Vessels up to 70,000 dwt, with a maximum draft of 12m, can berth alongside. Vessels up to 275,000 dwt can be accommodated in midstream.

The port authority applies an underkeel clearance of 1.2m and a swell allowance of 0.5m.

A quay extends 1.5 miles E and SE from the root of the breakwater and affords ten numbered berths, including berths for tankers and ore carriers at the SE end.

Limitations at these berths are given in the table below:

MURMAGAO BAY—BERTH LIMITATIONS			
Berth No.	Length	Depth	Remarks
1	84m	1.8-3.0m	Barge loading.
3	134m	7.0m	Collapsed. Not used.
4	139m	8.5m	Collapsed. Not used.
5	159m	8.5m	General cargo.
6	223m	6.0m	General cargo
7	100m	3.5m	Barges.

MURMAGAO BAY—BERTH LIMITATIONS			
Berth No.	Length	Depth	Remarks
8	116m	12.5m	Oil berth. Berthing length is 298m between mooring dolphins. Maximum length allowed is 248m. Maximum draft allowed is 12.5m. During the Southwest Monsoon, the maximum draft allowed is 10.4m, while the maximum length allowed is 198m.
9	222m	13.0m	Ore berth. Berthing length is 335m between mooring dolphins. Maximum length allowed is 305m. Maximum draft allowed is 12.3m, although 13m may be allowed according to conditions.
10	250m	11.0m	General, bulk, and container cargo
11	300m	11.0m	General, bulk, and container cargo

Draft limitations for the above berths are subject to frequent change in conjunction with the state of tide, underkeel clearance, prevailing sea, and weather conditions. Details of changes can be obtained from the local pilot or the Port Officer.

It has been reported (1995) that depths alongside the wharves are 3m less than charted.

A floating dock extends NE from Berth No. 1. A breakwater extends NE from between Berth No. 2 and Berth No. 3. Both structures are best seen on the chart.

Vessels requiring to top-off to their seasonal mark may be permitted W of the breakwater during fair weather season.

Several mooring buoys are situated NE and E of the head of the mole. Five finger piers for small vessels and barges lie within 0.2 mile SE of the ore berth.

It was reported (1991) that the swell conditions associated with the Southwest Monsoon often close the port to shipping and can significantly reduce the limiting draft for vessels using the port.

**Off-lying dangers.**—Foul ground borders Grandi Island up to 0.3 mile offshore. A 5m patch lies about 0.5 mile NE of the E end of the island and other patches, with depths of 3.9m, lie 0.7 mile N and 0.6 mile NNW of the same position.

Saint Georges Reef, which dries 1.5m, lies about 0.3 mile E of Grandi Island.

Sail Rock, 14m high, lies about 0.5 mile S of the W end of Grandi Island; this pillar rock can easily be mistaken for a sail. A reef, which dries 1.2m, lies about 0.2 mile NE of Sail Rock.

Saint Georges Bank, with a least depth of 6.5m, lies about 0.8 mile WNW of Grandi Island.

Martha Patches, a group of rocky shoals with a least known depth of 2.7m, lie about 1 mile N of Grandi Island.

Marmugao Rocks, with a least depth of 6.1m, lie about 0.5 mile N of Marmugao Point, and are marked on their S side by Lighted Channel Buoy No. 6.

An 8.2m patch and a 7.9m patch lie about 0.5 mile NNW and 1.3 miles W of Marmugao Point.

Amee Shoals, close N of Marmugao Rocks, lie in the middle of the entrance to Marmugao Bay, and is a group of shoals, with a least depth of 1.8m.

Sunchi Reefs, about 1 mile S of Kabo Rajniwas, are rocky shoals one of which dries 0.9m. Marivel Patches, with a least depth of 1.5m, lie close NE.

Kambariam Islet (Buffalo Rock), 7m high, lies about 1 mile SW of Marmugao Point, the NW extremity of Marmugao Head. Foul ground extends about 0.2 mile N of the islet.

Sawyer Patches, with depths of 5.5m, lie about 0.5 mile N of Kambariam Islet.

## Aspect

**Aspect.—Marmugao Head** (15°24'N., 73°48'E.), about 61m high, is a tableland peninsula with steep sides, especially W. It is connected to the mainland SE by a narrow neck of low ground.

The S side of Marmugao Bay is bold and rocky, rising to the tableland of Marmugao Head.

The N shore of the bay between Kabo Rajniwas and Saint Nazaret Point, about 4.5 miles ESE, consists of alternating stretches of sand and rock. The land within is covered with jungle and rises to an elevation of 45m.

A radio mast, with an elevation of 175m, is conspicuous about 2 miles NNW of Saint Nazaret Point.

A conspicuous water tower, with an elevation of 96m, is situated about 0.5 mile SE of Marmugao Point.

Lights, in line bearing about 101°, on the S side of the bay, lead through the entrance channel. The front light is shown from Chikalin Point, about 3 miles E of the breakwater. The rear light is shown from Saint Jasintu Island, about 1.3 miles farther E.

North Head Breakwater Light is shown from a white concrete tower at the N point of the breakwater.



**North Head Breakwater Light**

A mole extends E about 0.1 mile from E side of the breakwater; Breakwater East Head Light is shown from a squat masonry tower at the head of the mole.

The **Grandi Islands** (15°21'N., 73°46'E.) consists of three islands about 2.5 miles SSW of Marmugao Head, and is the collective name of the two S islands, which are connected by a narrow reef of rock and shingle. The W of the two islands, 76m high and conical, is bold, rocky, and covered with trees towards its summit. The E island rises to a 73m summit at its E end, which, with the N side of the island, is covered with jungle.

Pikene Island, 60m high and the third of the Grandi group, lies about 10.3 miles NE of Grandi Island. This circular island is flat-topped, precipitous, and covered with trees.

Grandi Island Light is shown from a four-sided metal tower on the summit of the W island. In 1974, an obstruction was reported 1.5 miles WSW of Grandi Island Light. A prohibited anchorage projects 1.8 miles W and 1 mile S, from the W end of Grandi Island.

## Pilotage

Pilotage is compulsory and vessels should give advance notice of their ETA. During fair weather the pilot boards 0.5 mile W of the fairway buoy. Vessels awaiting a pilot anchor 1 mile W of the light structure at the head of the breakwater, and hoist the pilot signal 30 minutes before the pilot is required to board. During the Southwest Monsoon, when pilots cannot board, a launch will guide vessels from the breakwater head to a suitable anchorage.

It was reported (1994) that night pilotage in good weather is available only to vessels using Berth No. 8 or Berth No. 9. Vessels over 280m long using Berth No. 9 are berthed during daylight hours only.

## Signals

The quarantine signal of the International Code of Signals must be shown by all vessels entering the port, and kept flying until pratique has been granted. The health official boards either at the anchorage or alongside the quay. Radio pratique may be granted.

A signal station is near the NW extremity of Marmugao Head

## Anchorage

Large vessels can anchor S of Grandi Island, with shelter from NW winds, in about 18m, mud, about 0.4 mile SW of the SE extremity of Grandi Island. Smaller vessels can anchor, in about 17m, about 0.1 mile ESE of the above point.

Anchorage can be taken in Marmugao Bay, in 7m, about 0.6 mile NE of the head of the breakwater.

Anchorage is prohibited between Searle Patch (15°27'N., 73°48'E.) and Amee Shoals, 1 mile SW.

## Directions

Vessels bound for Marmugao Bay from the S should pass about 2 miles W of Grandi Island and about 1 mile W of Kambariam Islet, then steer NE to enter the buoyed channel.

Vessels approaching from N should steer to pass about 2 miles W of **Aguada Head** (15°29'N., 73°46'E.), then keep Kambariam Islet in range with the E end of Grandi Island,

bearing 168°; this leads W of all dangers in the entrance to Marmugao Bay.

When Chikalin Point Light, shown from a white round tower 3 miles E of the breakwater, is in line with Saint Jasintu Island Light, shown from a similar structure, bearing about 101°, alter course to keep them thus aligned, and then steer as necessary to anchor or to enter harbor: except on the leading line the near leading light is difficult to identify among trees. Alternately, the buoyed channel may be used.

### Caution

At night do not proceed into depths less than 13m when between Aguada Head and Saint George's Islands.

The sea breaks heavily on the dangers in the entrance during the Southwest Monsoon.

During the Southwest Monsoon, in presence of heavy swell at the approach to the port, good steerage should be maintained while rounding the breakwater to avoid being set E; ensure there is sufficient underkeel clearance to allow for the swell and maneuvering.

A spoil ground lies 2 miles WNW of Marmugao Point.

Dangerous wrecks lie 1.3 and 0.8 miles from the fairway buoy.

Submarine Exercise Areas are centered 30 miles and 45 miles W and 20 miles SW of Marmugao Head.

A channel, marked by lighted and unlighted buoys, leads S of the spoil ground and N of Marmugao Head to the harbor.

### Marmugao Bay to Cape Rama

**2.51** The coast between **Cola Bay** (15°22'N., 73°53'E.) and the Sal River, about 14 miles SSE, consists of low cultivated land with several churches on small hills.

Anchorage, sheltered from NW winds, can be taken, in a depth of about 7m, in Cola Bay.

The Sal River, entered close N of **Betul Point** (15°08'N., 73°57'E.), may only be used by small vessels and local knowledge is required. Cargo is handled by lighters from the wharf at Betul, on the S side of the river entrance.

Chandranath Temple stands on a hill with an elevation of 349m, about 7 miles NE of the entrance to the Sal River.

Anchorage can be obtained, in about 10m, mud, from 1.3 to 2.3 miles W of Betul Point.

Canaguinim Bay is entered between Canaguinim Point, about 1 mile SW of Betul Point, and Moliem Point, about 2 miles SW. Two rock patches, each drying 1.2m, lie about 0.1 mile and 0.3 mile, respectively, SW of Canaguinim Point. Cliffs, about 38m high, lie on the E half of the bay. A rocky islet, 0.9m high, lies at the head of the bay.

Anchorage can be taken, in 9.1m, 0.5 mile NNE of Moliem Point.

Rama Bay lies between Moliem Point and Cape Rama, about 1.3 miles SSW. Cliffs at the head of the bay rise to elevations of 40 to 61m. A small islet lies close W of Moliem Point.

Anchorage can be obtained, in about 11m, mud, 0.5 mile NNE of Cape Rama